

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10, Amendment: 0004

Summary Information

Title: "Contaminated Sediments Support for the Great
Lakes National Program Office"
Period of Performance: From: 08/04/09
To: 06/22/10
Award Date: 08/04/09
Total Funding:

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.	(b)(4)		
Fixed Fee	Base Pd.			

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 3661 to 3637.

United States Environmental Protection Agency
Washington, DC 20460Work Assignment Number
10

Work Assignment

☐ Original ☒ Amendment Number: 3Contract Number
EP-W-09-024

Contract Period

Base X

Option Period Number

Title of Work Assignment

"Contaminated Sediments Support for the
Great Lakes National Program Office"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/04/09

To: 06/22/10

Comments:

The purpose of this amendment is to increase the LOE by 1,370 Professional Labor Hours to complete Tasks 1, 2 and 3 of the SOW. A revised Financial Work Plan is required.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$468,254.00	2,291
This Action	\$0.00	1,370
Total	\$468,254.00	3,661

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE: 1,370
Cumulative Approved:	Cost/Fee: \$468,254.00	LOE: 3,661

Work Assignment Manager Name

E. M. WINES

(Signature)

(Date)

Branch/Mail Code G17J

Phone Number (312) 866-6036

Fax Number (312) 886-8121

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10, Amendment: 0003

Summary Information

Title: "Contaminated Sediments Support for the Great Lakes National Program Office"
Period of Performance: From: 08/04/09
To: 06/22/10
Award Date: 08/04/09
Total Funding:

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 2291 to 3661.



Work Assignment

☐ Original ☒ Amendment Number: 2Contract Number
EP-W-09-024

Contract Period

Base X

Option Period Number

Title of Work Assignment

"Contaminated Sediments Support for the
Great Lakes National Program Office"

Contractor

BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW

See attached Statement of Work

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 08/04/09

To: 06/22/10

Comments:

The amendment fully approves the Technical and Financial Work Plan dated 08 September 2009, which increases the total amount of this Work Assignment to \$468,254.00. Currently, there are 2,291 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$400,000.00	2,291
This Action	\$68,254.00	0
Total	\$468,254.00	2,291

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 09/08/09	Cost/Fee:	LOE:
Cumulative Approved: 06/04/10	Cost/Fee: \$468,254.00	LOE: 2,291

Work Assignment Manager Name

E. M. WINES

(Signature)

(Date)

Branch/Mail Code G17J

Phone Number (312) 866-6036

Fax Number (312) 886-8121

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10, Amendment: 0002

Summary Information

Title: "Contaminated Sediments Support for the Great
Lakes National Program Office"
Period of Performance: From: 08/04/09
To: 06/22/10
Award Date: 08/04/09
Total Funding:

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.	\$ (b)(4)		
Fixed Fee	Base Pd.			

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-10

Work Assignment

☐ Original ☒ Amendment Number: 1Contract Number
EP-W-09-024Contract Period
Base X

Option Period Number

Title of Work Assignment
"Contaminated Sediments Support for the
Great Lakes National Program Office"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 08/04/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 08 September 2009, capping the total cost at \$400,000.00. Currently, there are 2,291 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$0.00	1,956
This Action	\$400,000.00	335
Total	\$400,000.00	2,291

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 09/08/09	Cost/Fee: \$400,000.00	LOE: 335
Cumulative Approved: 10/01/09	Cost/Fee: \$400,000.00	LOE: 2,291

Work Assignment Manager Name

E. M. WINES

(Signature)

(Date)

Branch/Mail Code G17J

Phone Number (312) 866-6036

Fax Number (312) 886-8121

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

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Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10, Amendment: 0001

Summary Information

Title: "Contaminated Sediments Support for the Great
Lakes National Program Office"
Period of Performance: From: 08/04/09
To: 06/22/10
Award Date: 08/04/09
Total Funding:

WA Totals

The following item(s) have been added:

Category	POP	Amount
Estimated Cost	Base Pd.	\$ (b)(4)
Fixed Fee	Base Pd.	

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 1956 to 2291.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-1

Work Assignment

☒ Original ☐ Amendment Number:

Contract Number
EP-W-09-024

Contract Period
Base X

Option Period Number

Title of Work Assignment
"Contaminated Sediments Support for the
Great Lakes National Program Office"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See attached Statement of Work

Purpose: ☒ Work Assignment Initiation ☐ Work Assignment Close-Out
☐ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/04/09

To: 06/22/10

Comments:

Work Assignment Initiation

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:
Previously Approved

Cost/Fee

LOE

This Action

Total \$0.00

1,956

Work Plan / Cost Estimate Approvals

Contractor WP Dated :

Cost/Fee:

LOE:

Cumulative Approved:

Cost/Fee: \$0.00

LOE: 1,956

Work Assignment Manager Name

E. M. WINES

(Signature)

(Date)

Branch/Mail Code G17J

Phone Number (312) 866-6036

Fax Number (312) 886-8121

Project Officer Name

SINETA WOOTEN

(Signature)

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Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10

Summary Information

Title: "Contaminated Sediments Support for the Great
Lakes National Program Office"
Period of Performance: From: 08/04/09
To: 06/22/10
Award Date:
Total Funding:

Procurement Management Roles

WORK ASSIGNMENT MANAGER:

U.S. E.P.A.
Attn: E. M. WINES
77 WEST JACKSON BLVD
CHICAGO, IL 60604

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Attachments

Attachment Name

"Contaminated Sediments Support for the Great Lakes National Program
Office"

"Contaminated Sediment Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10

Battelle Contract Number EP-W-09-024

Work Assignment Number: WA 0-10

Date: 04 August 2009

Purpose and Background

The Great Lakes are among the largest and most complex freshwater ecosystems in the world, providing a home, water and food to millions of aquatic plants, animals and people. The Great Lakes Legacy Act of 2002 is part of a larger strategy to provide a healthy, natural Great Lakes environment for swimming and fishing as well as a source of clean water for drinking and industrial uses.

Although discharges of toxic chemicals to the Great Lakes have been reduced in the last 30 years, high concentrations of contaminants persist in the sediment (mud) of some rivers, harbors and bays as a "legacy" of North America's industrialization.

Harmful pollutants to the Great Lakes include polychlorinated biphenyls (PCBs), heavy metals, oil and grease and polycyclic aromatic hydrocarbons (PAHs). Contaminants like PCBs settle into the sediment and can enter the food chain when they are ingested by fish where they can cause adverse effects to human health and the environment.

To help address the contaminated sediment problem, the Great Lakes Legacy Act of 2002 was signed into law on Nov. 27, 2002. The Act authorizes \$270 million in funding over five years, beginning in 2004, to specifically assist with the cleanup of contaminated sediment in America's 31 Areas of Concern or AOCs. AOCs are designated by the United States and Canada as locations where beneficial consumption, dredging activities, or drinking water consumption have been impaired or restricted. For most of these AOCs, the driving factor causing the impairment is contaminated sediment. U.S. Environmental Protection Agency's Great Lakes National Program Office administers the Legacy Act.

As of December 2007, five remediation projects have been largely completed and several more are scheduled to get under way in 2008. Nearly 800,000 cubic yards of sediment have been cleaned up, removing 1.5 million pounds of contaminants.

As these GLLA projects are completed it is important to be able to measure the overall success of each individual project to be able to monitor overall Program effectiveness. This Statement of Work (SOW) provides the basis for monitoring support to allow for the conduct of pre-remedial baseline assessments as well as post-remedial assessments to allow GLNPO to better evaluate GLLA Program effectiveness. Additionally, this SOW provides the basis for support for site characterization at locations under the reauthorization of the GLLA. The universe of sites that will be incorporated in this program include Great Lakes Areas of Concern. The approach outlined below to evaluate the effectiveness of the program will allow GLNPO to make rigorous, qualitative assessments based on quantitative data as to whether sediment chemistry, sediment toxicity, benthic community, and/or bioaccumulation potential after implementation of a sediment remediation project is better, worse, or unchanged when compared to pre-project conditions. The site characterization analysis will be more quantitative in nature and look at the nature and extent of sediment contamination in a phased approach. The

ultimate goal of the site characterization under the reauthorization of the GLLA is a complete site characterization that can inform remedial actions.

This approach will allow for a more efficient way to characterize a site by ensuring that only the most pertinent information is collected at each phase in the process, and improve the likelihood that a proposed remedy is neither excessive in size nor inadequate.

Quality System Documentation

The EPA quality policy requires every project involved in the collection of environmental data (measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology) must have written and approved quality system documentation that meets the American National Standard Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs, ANSI/ASQC E4-1994. "Quality System Documentation" includes a Quality Management Plan (QMP), a Quality Assurance Project Plan (QAPP), or such other documentation which demonstrates compliance with ANSI/ASQC E4-1994. The purpose of the documentation is to specify the policies, organization, objectives, and the quality assurance activities needed to achieve the project objectives of the environmental collection activity.

A contractor with current, approved Quality System Documentation will, by the earlier of (i) the 30th day prior to collection of environmental data and (ii) the 90th day after the project start date, notify GLNPO's Quality Assurance Manager of the way it is applying the above standard to this project. In all other cases, Quality System Documentation shall be submitted for approval to GLNPO by the earlier of (i) the 30th day prior to collection of environmental data and (ii) the 90th day after the project start date.

Contact GLNPO's Quality Manager, Louis Blume (312) 353-2317 with questions or to request sample documentation. Further guidance is available in EPA QA/R-5 "EPA Requirements for Quality Assurance Project Plans."

Data Management

Data management procedures shall begin during project planning activities. The contractor shall follow the "Great Lakes Legacy Act Data Reporting Standard" (including the stand-alone list of minimum field data requirements) in Appendix B on accompanying CD. The data standard (1) details requirements for collection and submittal of field and laboratory data, (2) provides guidance on complying with the requirements, and (3) includes as attachments current EPA guidance documents that define structures of the acceptable electronic data deliverables (EDD), as well as templates for each of the acceptable EDDs. Additional data collection or reporting requirements specific to the project may be required and will come from technical direction from the WAM.

The contractor shall ensure that field staff are properly trained in the collection of locational data per the U.S. EPA's "Interim Guidance for Developing Global Positioning System Data Collection Operating Procedures and Quality Assurance Project Plans," Revision 1.0, dated February 2008 (Attachment 4 of Appendix B of accompanying CD). To document adherence to the locational data policy, the contractor shall complete the "U.S. EPA Great Lakes National Program Office Locational Data Checklist and Metadata

"Contaminated Sediment Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10

Recording Form" in Appendix C of accompanying CD for each data collection event.

General Requirements

Tasks to be provided include, but are not limited to: statistical sampling design; sediment/porewater sampling support; sample analysis for chemical, physical and biological tests; QAPP development; data reporting; mapping of results; data management and final reporting.

The following tasks will involve analytical sampling and will therefore require the development of Quality Assurance Project Plans (as outlined above) for each task. The contractor shall comply with the outlined sampling and testing requirements outlined in Appendix A. These requirements should be considered as guidance but may be modified per task. Any modifications will come from technical direction from the WAM.

The total number of technical hours for this Work Assignment shall not exceed 1956. The contractor shall notify the EPA WAM when 75% of the allotted hours have been reached either in any one subtask or in the overall work assignment.

Unless otherwise identified under a specific task, TSCA CBI requirements will not apply.

This Work Assignment will start with the date of the Contracting Officer's signature and extend through June 22, 2010.

Task 1: Additional work necessary to complete projects began under Contract EP-W-04-021, work assignment 2-11.

Work was conducted under the above contract and work assignment to provide assistance to GLNPO to monitor the effectiveness of the program at four (4) sites in the Great Lakes (Division Street outfall – Task 1; Ruddiman Pond and Main Branch – Task 2; Kinnickinnic River – Task 3, and; West Branch of the Grand Calumet River – Task 4). This task will allow the completion of final reports for these four sites as well as additional QA requirements with respect to data deliverables. In addition, for Task 1, Division Street Outfall, additional hours will be provided to have an "expert" in mercury analysis review the total and methyl mercury data collection procedures as well as the results. The expert will provide an interpretation of the results and their usefulness for their intended purpose. This interpretation should be incorporated into the Division Street Outfall report. This may entail one or two conference calls between the contractor, the expert and GLNPO prior to incorporation of the data interpretation into the final report. There shall be no duplication of work completed under the previous WA and this work will be initiated from technical direction from the WAM.

I. Deliverables

The Contractor shall prepare and provide the following documents:

1. Final reports will be submitted in both paper and electronic copies following final comments provided by the EPA WAM. Electronic copies will be provided in both original (native) formats as well as in Adobe Acrobat format.
2. Final Electronic data deliverable in spreadsheet or database format containing all location, chemistry, toxicology, bioaccumulation and physical data collected as part of

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10

this sampling effort. See Appendix B of accompanying CD for GLNPO's "Great Lakes Legacy Act Data Reporting Standard."

Deliverable	Due Date	2009 Target Date
Draft Technical and Financial Work Plan submitted by Battelle	Within 2 weeks of receipt of TO	TBD
Final Technical and Financial Work Plan submitted by Battelle	2 weeks after receipt of comments from GLNPO	TBD
Final GLNPO report and final data summary package submitted by Battelle	Within 30 days of receipt of GLNPO comments on draft final data summary	Per direction from WAM

II. Period of Performance

This task will start with the date of the Contracting Officer's signature and extend through June 22, 2010.

III. Level of Effort

The number of technical hours for this task shall not exceed 120. The Contractor shall notify the EPA WAM when 75% of the allotted hours have been reached either in any one subtask or in the overall work assignment.

IV. EPA Contacts

Work Assignment Manager:

E. Marie Wines
U.S. Environmental Protection Agency (G-17J)
77 W. Jackson Boulevard
Chicago, IL 60604
Phone: (312) 886-6034
Fax: (312) 353-2018
Email: wines.e-marie@epa.gov

EPA Technical Project Manager

Scott Ireland
U.S. Environmental Protection Agency (G-17J)
77 W. Jackson Boulevard
Chicago, IL 60604
Phone: (312) 886-8121
Fax: (312) 697-2553
email: ireland.scott@epa.gov

Task 2: Determination of the nature and extent of potential contaminant concentrations in sediments within the Cuyahoga River project area.

The Cuyahoga River flows into the central basin of Lake Erie at Cleveland, Ohio. The lower 45 miles of the river, from the Ohio Edison Dam to the mouth, plus 10 miles of

Lake Erie shoreline is an AOC that has long been considered the single most environmentally disturbed river system tributary to Lake Erie. It is on the Clean Water Act Section 303 list of impaired waters. However, water quality problems associated with point source discharges to the river have largely been resolved and aquatic life has responded well to these water quality improvements. The Ohio Edison (gorge) dam was identified in the Ohio *2008 Integrated Water Quality Monitoring and Assessment Report* as a significant contributor to non attainment of the state's water quality standards due to habitat alteration and hydraulic modification (Ohio EPA, 2008). The U.S. EPA-approved total maximum daily loads (TMDLs) (Ohio EPA, 2003) recommend that dams be evaluated for removal/modification. Any efforts towards remediation through dam removal/modification must begin with the proper characterization of the sediments behind the dam. Specifically, this site of interest includes approximately 1.4 miles of the Cuyahoga River above the dam.

Under Task 6, work assignment 4-15, contract EP-W-09-024, the contractor developed field sampling plan (FSP) and a quality assurance project plan (QAPP). This task will allow for the completion of the QAPP, but no work completed under the previous work assignment shall be duplicated. Additionally, this task will allow for the sample collection and analytical analysis.

I. Site Objectives

1. Complete QAPP based on technical direction from the WAM.
2. Determine the nature and extent of sediment contamination in the Cuyahoga River assessment area. This will be done by following the FSP/QAPP to determine if and how many additional samples will need to be collected in phase II of this operation.
3. Make recommendation to the WAM on the number/type of necessary additional parameters to determine the nature and extent of sediment contamination that will inform remedial options to support the removal of the gorge dam.

II. Site Scope of Work

Subtask 2.1 Task Management

The Contractor shall prepare and submit a work plan in accordance with the requirements of this contract. The Contractor shall also participate in general planning conference calls and on-site meetings, prepare monthly progress reports, and conduct other task management activities.

The Contractor's monthly progress reports shall provide a breakdown of costs for each subtask. Costs shall be provided on a bimonthly basis.

The Contractor shall ensure that appropriate quality assurance measures are taken. Deliverables are expected to be of high quality and to contain a minimum of errors (unless the document requested is simply an interim draft).

The Contractor shall submit all final reports/documents as Microsoft Word, Excel and

Adobe Acrobat Portable Document File, via email and/or disk.

Subtask 2.2 Sample Collection and Laboratory Analysis

In accordance with Appendix A, the Contractor shall support the U.S. EPA in the field during the Cuyahoga River sampling event. The field effort is tentatively scheduled for summer of 2009. The Contractor shall also provide services to analyze samples, report field and laboratory results, and provide an interpretive report of field and laboratory results. Forty (40) sediment samples and four field duplicates will be collected and analyzed for the following contaminants of concern (COCs):

- PCB Aroclors
- PAHs (N = 36)
- Eight trace metals (Total As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
- AVS/SEM
- Pesticides
- Volatile Organic Compounds
- Oil and grease
- Total organic carbon (TOC)
- Particle size distribution (PSD)
- Bulk density (wet and dry)
- Percent moisture

Subtask 2.3 Quality Assurance and Data Validation

Complete QAPP without duplicating efforts, and ensure to adequately document data verification, validation, and management procedures. Prior to initiation of this subtask, the WAM will initiate a conference call with the Contractor to define the appropriate project-specific quality system documentation.

Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications. Data validation, however, is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedure, or contractual compliance (i.e., data verification) to determine the quality of a specific data set relative to the end use. The potential effects of the deviation will be evaluated during the data quality assessment.

The Contractor shall ensure that all data collected under this work assignment shall be of sufficient quality to determine the need for additional analysis to determine the nature and extent of sediment contamination.

Subtask 2.4 Data Management

The Contractor shall submit all electronic data deliverables in spreadsheet or database format containing all location, chemistry and physical data collected as part of this sampling effort. All results files submitted must include results for all quality control (QC) samples and parameters required by the QAPP. The contractor shall ensure that the lab specifies which set of results should be considered reportable when multiple dilutions or reanalysis of samples occurs. The required formats for electronic data deliverables will

be provided by the WAM. See Appendix B of accompanying CD for GLNPOs "Great Lakes Legacy Act Data Reporting Standard."

Subtask 2.5 Support for Outreach, Public Communication, Public and Other Meetings

The Contractor shall prepare materials in support of and will attend site-related meetings. It is anticipated that there will be at least one meeting. The Contractor (as directed by the EPA WAM) shall prepare at least one site-related fact sheet.

III. Deliverables

The Contractor shall prepare and submit a revised work plan in accordance with contract requirements. EPA will approve the work plan in accordance with contract requirements.

The Contractor shall prepare and provide the following deliverables as part of the final GLNPO report for the GLNPO pre-characterization sampling and analysis project:

1. Copies of raw laboratory data reports containing the final data package submitted by the laboratories regarding analyses performed as part of this project. [The full data package shall include a narrative summary, chain-of-custody forms, results forms, raw data, electronic results, and non-project information.]
2. Electronic data deliverable in spreadsheet or database format containing locational, chemical, and physical data collected as part of this sampling effort. See Appendix B of accompanying CD for GLNPO's "Great Lakes Legacy Act Data Reporting Standard."

Subtask	Deliverable	Due Date	2009 Target Date
1 - Work Plan	Draft Technical and Financial Work Plan submitted by Battelle	Within 2 weeks of receipt of TO	TBD
	Final Technical and Financial Work Plan submitted by Battelle	2 weeks after receipt of comments from GLNPO	TBD
2 - QAPP/FSP	Draft GLNPO QAPP and FSP submitted by Battelle	Completed under WA 4-15	NA
	Final GLNPO QAPP and FSP submitted by Battelle	Within 7 days of receiving GLNPO comments on Draft QAPP and FSP	Per direction from WAM
3 - Sampling & Analysis	GLNPO pre-characterization sediment sampling analyses completed by GLNPO and Battelle	Dependent upon sampling start date, weather, and other factors	Per direction from WAM
4 - Reporting	Monthly Progress Reports submitted by Battelle	20th of each month	20th of each month

"Contaminated Sediments Support for the Great Lakes National Program Office"

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Draft data summary of
GLNPO characterization
sediment chemistry
analyses submitted by
Battelle

Within 1 month of
completing sampling

Per direction from
WAM

Draft Final GLNPO report
and draft data summary
package with phase II
sampling recommendation
submitted by Battelle

Within 1 month of
completing sampling

Per direction from
WAM

Final GLNPO report and
final data summary
package submitted by
Battelle

Within 2 months of
completing sampling

Per direction from
WAM

IV. Period of Performance

This task will start with the date of the Contracting Officer's signature and extend through June 22, 2010.

V. Level of Effort

The number of technical hours for this task shall not exceed 918. The Contractor shall notify the EPA WAM when 75% of the allotted hours have been reached either in any one funding category or in the overall work assignment.

VI. EPA Contacts

Work Assignment Manager:

E. Marie Wines

U.S. Environmental Protection Agency (G-17J)

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Task 3: Baseline Assessment of Environmental Remediation of Contaminated Sediments of the Ottawa River in the Maumee River Area of Concern

The Ottawa River in northwest Ohio is a constituent of the Maumee AOC. In 1987, the Maumee AOC was classified by the International Joint Commission (IJC) because it was

found to have impairments for 10 of the 14 evaluated beneficial uses, primarily due to sediment contamination from heavy metals and organic chemicals. The project area is roughly an 8.8 mile stretch of the Ottawa River, from the mouth of the river at Lake Erie's Maumee Bay (River Mile [RM] 0.0) upstream to Auburn Road in Toledo, Ohio (RM 8.8). The final design for this project is underway, but the likely remediation scenario will include the removal of approximately 257,000 cubic yards (CY) of contaminated sediment from the lower portion of the Ottawa River (including roughly 14,000 CY from the Sibley Creek tributary).

U.S. EPA is planning to remediate several sections of the Ottawa River within Reaches 2, 3, and 4 (see Section 1.2) after completion of a baseline assessment. The purpose of the baseline assessment is to document current (i.e., pre-remediation) conditions in the area as a benchmark against which post-remediation monitoring will be evaluated. This will permit sound statistical comparisons of the contamination's spatial scale, the magnitude of ecological stress before and after implementation of remedial action, and effectiveness of the remediation. Qualitative adjustments will be made on what pre- and post-remediation quantitative datasets mean.

A field sampling plan (FSP) and quality assurance project plan (QAPP) were completed under the previous contract (EP-W-04-021), work assignment WA-4-15. No work shall be duplicated under this WA.

I. Site Objectives

1. Generate pre-remediation characterization of chemical and biological data on the contaminated sediments in the WBGCR investigation area as a basis for comparison to post-remedial action sediment concentrations.
2. Generate pre-remediation characterization of the toxicology, bioaccumulation and bioavailability of contaminants as it currently exists in contaminated sediments in the Ottawa River investigation area. This data will be used as a basis for determining changes in ecosystem response and to evaluate impacts, if any, of contaminant removal/capping on ecosystem measures of health. The data collected during this study will be used by GLNPO, along with data collected after completion of the planned remediation project to evaluate the recovery of the Ottawa River investigation area over time. The long-term data collection activities are outside the scope of this study and will be undertaken on future projects.

II. Site Scope of Work

Subtask 3.1 Task Management

The Contractor shall prepare and submit a work plan in accordance with the requirements of this contract. The Contractor shall also participate in general planning conference calls and on-site meetings, prepare monthly progress reports, and conduct other task management activities.

The Contractor's monthly progress reports shall provide a breakdown of costs for each. Costs shall be provided on a bimonthly basis.

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10

The Contractor shall ensure that appropriate quality assurance measures are taken. Deliverables are expected to be of high quality and to contain a minimum of errors (unless the document requested is simply an interim draft).

The Contractor shall submit all final reports/documents in native format such as Microsoft Word, Microsoft Excel, GIS shape files, high resolution JPEGs and Adobe Acrobat Portable Document File, via email and/or disk.

The Contractor shall assist EPA in assuring that the many tasks to be carried out under this work assignment are completed in accordance with the overall GLLA schedule, and that information obtained in support of any GLLA-related task is also made available to all other relevant parties. In other words, the Contractor shall help assure that "economies of scale" are realized, that the implementation of the GLLA project baseline monitoring is carried out as efficiently as possible, and there will be no duplication of effort.

The Contractor shall prepare materials in support of and will attend site-related meetings. It is anticipated that there will be at least one meeting. The Contractor (as directed by the EPA WAM) shall prepare at least one site-related fact sheet.

Subtask 3.2 Statistical Support

- a. The Contractor shall provide statistical evaluation of data resulting from the baseline evaluation including, but not limited to, kriging of sediment concentrations.

Subtask 3.3 Sample collection and laboratory analysis

In accordance with Appendix A, the Contractor shall conduct testing for the GLNPO baseline sampling program which includes, but is not limited to:

- PCB Aroclors
- PAHs (N = 36)
- Eight trace metals (Total As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
- Oil and grease
- Total organic carbon (TOC)
- Particle size distribution (PSD)
- Bulk density (wet and dry)
- Percent moisture

At a subset of six stations, the following additional analyses will be performed:

- Sediment
 - PCB congeners
 - Acid volatile sulfide/simultaneously extracted metals (AVS/SEM)
(acid volatile sulfide and six simultaneously extracted metals – cadmium, copper, lead, nickel, silver, and zinc)
- Porewater
 - PAHs (N = 36)
 - NH₃
- Sediment toxicity testing
 - Acute and Chronic Amphipod Test
 - Acute and Chronic Midge Larvae Test

- Bioaccumulation exposures
 - Analyze tissues for:
 - PCB Congeners
 - PAHs
 - Lipid content

Subtask 3.4 Quality Assurance and Data Validation

Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications. Data validation, however, is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedure, or contractual compliance (i.e., data verification) to determine the quality of a specific data set relative to the end use. The potential effects of the deviation will be evaluated during the data quality assessment. Prior to initiation of this subtask, the WAM will initiate a conference call with the Contractor to define the appropriate project-specific quality system documentation.

The Contractor shall ensure that all data collected under this work assignment shall be of sufficient quality to determine the current baseline conditions of sediments within the defined area of the GLLA remediation project.

Subtask 3.5 Data Management

The Contractor shall ensure that all electronic data deliverables will be submitted in spreadsheet or database format containing all location, chemistry, toxicology, bioaccumulation and physical data collected as part of this sampling effort. The required formats for electronic data deliverables will be provided by the WAM. See Appendix B of accompanying CD for GLNPOs "Great Lakes Legacy Act Data Reporting Standard."

Subtask 3.6. Support for Outreach, Public Communication, Public and Other Meetings

The Contractor shall prepare materials in support of and will attend site-related meetings. It is anticipated that there will be at least one meeting. The Contractor (as directed by the EPA WAM) shall prepare at least one site-related fact sheet.

III. Deliverables

The Contractor shall prepare and provide the following documents:

1. Draft and final sampling summary report describing the number, location, results, and data analysis from this baseline assessment. The report will also document sampling changes made in the field along with any issues, concerns or problems encountered during data collection and analysis. The contractor will prepare a draft of the document and provide it to, at a minimum USEPA. Upon receipt of comments on the draft document, the Contractor shall have 30 days to revise the document and submit a final document. Final reports will be submitted in both paper and electronic copies. Electronic copies will be provided in both original (native) formats as well as in Adobe Acrobat format.
2. Copies of raw laboratory data reports containing the final data package submitted by the laboratories as part of this project.

"Contaminated Sediments Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10

3. Electronic data deliverables in spreadsheet or database format containing all location, chemistry, toxicology, bioaccumulation and physical data collected as part of this sampling effort. See Appendix B of accompanying CD for GLNPOs "Great Lakes Legacy Act Data Reporting Standard."

Deliverable	Due Date	2008 Target Date
Draft Technical and Financial Work Plan submitted by Battelle	Within one month of receipt of TO	TBD
Final Technical and Financial Work Plan submitted by Battelle	2 weeks after receipt of comments from GLNPO	TBD
Draft GLNPO QAPP and FSP submitted by Battelle	Completed under WA 4-15	NA
Final GLNPO QAPP and FSP submitted by Battelle	Within 7 days of receiving GLNPO comments on Draft QAPP and FSP	Per direction from WAM
GLNPO pre-characterization sediment sampling and bio-related analyses completed by GLNPO and Battelle	Dependent upon sampling start date, weather, and other factors	Per direction from WAM
Monthly Progress Reports submitted by Battelle	20th of each month	20th of each month
Draft data summary of GLNPO pre-dredging characterization sediment chemistry analyses submitted by Battelle (including statistical data interpretation and kriging)	Within 1 month of completing sampling	Per direction from WAM
Draft data summary of GLNPO pre-characterization sediment toxicity and bioaccumulation analyses submitted by Battelle (including statistical data interpretation)	Within 2 months of completing sampling	Per direction from WAM
Draft Final GLNPO report and draft data summary package submitted by Battelle	Within 30 days of receipt of GLNPO comments on draft data summary	Per direction from WAM
Final GLNPO report and final data summary package submitted by Battelle	Within 30 days of receipt of GLNPO comments on draft final data summary	Per direction from WAM

V. Period of Performance

This task will start with the date of the Contracting Officer's signature and extend through June 22, 2010.

VI. Level of Effort

The number of technical hours shall not exceed 918. The Contractor shall notify the EPA WAM when 75% of the allotted hours have been reached either in any one subtask or in the overall work assignment.

VII. EPA Contacts

"Contaminated Sediment Support for the Great Lakes National Program Office"

Contract: EP-W-09-024, Work Assignment: 0-10

Work Assignment Manager:

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Work Assignment

☐ Original ☒ Amendment Number: 5Contract Number
EP-W-09-024Contract Period
Base X

Option Period Number

Title of Work Assignment
Evaluation of Environmental Dredging in the
Ottawa RiverContractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
Tasks 1 & 3Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/13/09

To: 06/22/10

Comments:

The purpose of this amendment is to increase the LOE by 190 Professional Labor Hours (PLH) in order to complete tasks in the Statement of Work. A revised Financial Plan is required.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$615,226.00	4,054
This Action	\$0.00	190
Total	\$615,226.00	4,244

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE: 190
Cumulative Approved:	Cost/Fee: \$615,226.00	LOE: 4,244

Work Assignment Manager Name

RICHARD C. BRENNER

(Signature)

(Date)

Branch/Mail Code MS-190

Phone Number (513) 569-7620

Fax Number

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

Evaluation of Environmental Dredging in the Ottawa River

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0005

Summary Information

Title: Evaluation of Environmental Dredging in the Ottawa River
Period of Performance: From: 08/13/09
To: 06/22/10
Award Date: 08/13/09
Total Funding:

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 4054 to 4244.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number

0-11

☐ Original ☒ Amendment Number: 4

Contract Number
EP-W-09-024

Contract Period
Base X

Option Period Number

Title of Work Assignment
Evaluation of Environmental Dredging in the
Ottawa River

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
Tasks 1 & 3

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 08/13/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 05 April 2010, at a cost of \$269,602.00. Currently, there are 4,054 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$345,624.00	3,255
This Action	\$269,602.00	799
Total	\$615,226.00	4,054

Work Plan / Cost Estimate Approvals

Contractor WP Dated:	Cost/Fee: \$269,602.00	LOE: 799
Cumulative Approved:	Cost/Fee: \$615,226.00	LOE: 4,054

Work Assignment Manager Name

RICHARD C. BRENNER

Branch/Mail Code MS-190

Phone Number (513) 569-7620

Fax Number

(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

Branch/Mail Code 7404T

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(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

Contracting Official Name

CHRISTINE EDWARDS

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

Evaluation of Environmental Dredging in the Ottawa River

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0004

Summary Information

Title: Evaluation of Environmental Dredging in the Ottawa River
Period of Performance: From: 08/13/09
To: 06/22/10
Award Date: 08/13/09
Total Funding:

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.	\$ (b)(4)		
Fixed Fee	Base Pd.			

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 3255 to 4054.

The Anticipated Expiration Date has changed from 02/15/10 to 06/22/10.

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-11

Work Assignment

☐ Original ☒ Amendment Number: 4Contract Number
EP-W-09-024

Contract Period

Base X

Option Period Number

Title of Work Assignment

Evaluation of Environmental Dredging in the
Ottawa River

Contractor

BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW

Tasks 1 & 3

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out☒ Work Assignment Amendment ☐ Incremental Funding☒ Work Plan Approval

Periods of Performance

From: 08/13/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 05 April 2010, at a cost of \$269,602.00. Currently, there are 4,054 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$345,624.00	3,255
This Action	\$269,602.00	799
Total	\$615,226.00	4,054

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee: \$269,602.00	LOE: 799
Cumulative Approved:	Cost/Fee: \$615,226.00	LOE: 4,054

Work Assignment Manager Name

RICHARD C. BRENNER

Branch/Mail Code MS-190

Phone Number (513) 569-7620

Fax Number

(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

Branch/Mail Code 7404T

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(Signature)

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Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

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(Date)

Contracting Official Name

CHRISTINE EDWARDS

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

Evaluation of Environmental Dredging in the Ottawa River

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0004

Summary Information

Title: Evaluation of Environmental Dredging in the Ottawa River
Period of Performance: From: 08/13/09
To: 06/22/10
Award Date: 08/13/09
Total Funding:

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.	(b)(4)		
Fixed Fee	Base Pd.			

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 3255 to 4054.

The Anticipated Expiration Date has changed from 02/15/10 to 06/22/10.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number
0-1

Work Assignment

☐ Original ☒ Amendment Number: 3

Contract Number
EP-W-09-024

Contract Period
Base X

Option Period Number

Title of Work Assignment
Evaluation of Environmental Dredging in the
Ottawa River

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
Tasks 1 & 3

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/13/09

To: 02/15/10

Comments:

This amendment adds a new task. Please see the attached revised SOW for detailed information. A revised Technical and Financial Work Plan is required.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$345,624.00	2,381
This Action	\$0.00	874
Total	\$345,624.00	3,255

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE: 874
Cumulative Approved:	Cost/Fee: \$345,624.00	LOE: 3,255

Work Assignment Manager Name

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Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

Evaluation of Environmental Dredging in the Ottawa River

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

Summary Information

Title: Evaluation of Environmental Dredging in the Ottawa River
Period of Performance: From: 08/13/09
To: 02/15/10
Award Date: 08/13/09
Total Funding:

Attachments

The following item(s) have been added:

Attachment Name

Revised SOW for Amendment #3

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 2381 to 3255.

Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

SUPPLEMENTAL STATEMENT-OF-WORK
FOR
WORK ASSIGNMENT NO. 0-11
MODIFICATION 3
CONTRACT NO. EP-W-09-024

TITLE: Joint U.S. EPA GLNPO/ORD Project for Evaluation of Environmental Dredging for
Remediating Contaminated Sediments in the Ottawa River, Pre-Dredging
Characterization Phase (Phase 1)

PROJECT ADMINISTRATOR: U.S. EPA Office of Pollution Prevention and Toxics
(OPPT), Washington, DC

PROJECT CONTRACTOR: Battelle Memorial Institute, Columbus, OH

INTRODUCTION AND BACKGROUND

A partnership was formed in the summer of 2009 between the U.S. Environmental Protection Agency/Es (U.S. EPA/Es) Great Lakes National Program Office (GLNPO), located in Chicago, and the National Risk Management Research Laboratory (NRMRL) and National Exposure Research Laboratory (NERL), both located in Cincinnati and hereafter referred to as ORD (U.S. EPA Office of Research and Development). The purpose of this partnership is to undertake a comprehensive joint research evaluation of the Ottawa River (Toledo, OH) Environmental Dredging Project. Dredging will be implemented by GLNPO beginning in the spring of 2010 under its mandate from the Great Lakes Legacy Act (GLLA) of 2002 to oversee the clean up of contaminated sediments in the Great Lakes area.

The GLNPO/ORD partnership has developed an approach to evaluate remedial efficacy of environmental dredging that includes extensive sampling and analysis before, during, and after dredging operations to: 1) determine sediment and contaminant removal efficiencies, and 2) monitor and measure the impact of remedial operations and sediment removal on the river ecosystem. To compartmentalize the conduct of this project in manageable segments and to facilitate the development of an orderly and comprehensible data base, this project is being carried out in three phases:

- ò Phase 1 û Measurements conducted prior to dredging (Pre-Dredging Characterization Phase)
- ò Phase 2 û Measurements conducted during dredging (During Dredging Monitoring Phase)
- ò Phase 3 û Measurements conducted after dredging is completed (Post-Dredging Characterization Phase).

As dredging is not scheduled to commence until approximately 4/15/2010, Work Assignment (WA) 0-11 is devoted solely to the implementation of Phase 1 sampling and analytical activities. Phase 2 and Phase 3 studies will be conducted later in 2010 and in 2011 under a separate contract venue. Some Phase 1 tasks have already been completed in Fall 2009 and Winter 2010 under the Contractor's initial Technical and Financial Work Plans approved in 2009. This supplemental Statement-of-Work (WA 0-11, Mod. 1) details additional field and laboratory work to be pursued under Phase 1 this coming spring prior to initiation of dredging in April 2010.

PROGRESS TO DATE

The following Phase 1 tasks have been completed or are in the process of being completed under the original

Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

Work Plan:

- Task 1. Development and Approval of Work Plan (completed)
- Task 2. Development and Approval of Quality Assurance Project Plan (QAPP) (completed)
- Task 3. Development and Approval of Health and Safety Plan (HASP) (completed)
- Task 4. Installation and Retrieval of Semi-Permeable Membrane Devices (SPMDs), Body Burder Hester-Dendy Macroinvertebrate Samplers (BB H-Ds), and Replicate Ohio EPA Hester-Dendy Macroinvertebrate Samplers (ECO H-Ds) (completed)
- Task 5. Collection of Composite Surface Sediment and Grab Water Samples Associated with Task 4 (completed)
- Task 6. Conduct of Sediment and Water Analyses on Samples Collected in Task 5 (completed)
- Task 7. Conduct of SPMD Analyses on Samples Collected in Task 4 (samples currently being re-analyzed)
- Task 8. Conduct of BB H-D Macroinvertebrate Analyses on Samples Collected in Task 4 (completed)
- Task 9. Conduct of Fish Tissue Analyses on Fish Collected by ORD (completed)
- Task 10. Preparation of Monthly Progress Reports (continuing)
- Task 11. Preparation of Final Data Report (scheduled for completion prior to 6/22/2010).

DESCRIPTION OF SUPPLEMENTAL TASKS

The additional work specified under this supplemental SOW is concerned primarily with the collection of core sediment samples to develop contaminant depth profiles in undisturbed sediment prior to the onset of dredging. Collection of pre-dredge core samples was deferred to this coming spring and not carried out last fall along with the other pre-dredging characterization tasks itemized above under Progress to Date to facilitate collection of pre-dredge sediment and contaminant depth profile and inventory data as close to the onset of dredging as possible. This timing will be important in calculating sediment and contaminant removals when comparing pre-dredge sediment depth profile data with post-dredge residual sediment depth profile data.

The section of the Ottawa River to be dredged consists of selected segments of the final (most northerly) 8.8 miles of the river before it discharges into the mouth of the Maumee River. This section of the Ottawa River has been divided into four reaches by GLNPO for the purposes of developing a dredge plan (see Attachment 1). Based on historical data and pre-dredging sampling conducted by GLNPO, the segments of these four reaches designated to be dredged are shown as a series of dredge management units (DMUs) or dredge prisms in Attachment 2. Attachment 2 consists of four GLNPO maps labeled Figures 3.2 - 3.5. This series of GLNPO maps comprises the current dredge plan for this project (Note: This dredge plan is subject to change by

Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

GLNPO). The dredge prisms are shown as zones labeled beginning with the letter A in each of Reach 2 (River Mile {R.M.} 3.2 - R.M. 4.9), Reach 3 (R.M. 4.9 - R.M. 6.5), and Reach 4 (R.M. 6.5 - R.M. 8.8). No dredging is planned for Reach 1 that fans out into a delta as it empties into the Maumee River. The projected dredge depth or dredge cut of each prism is color coded in a legend at the bottom of each map.

Pre-dredge characterization sampling will be limited to dredge prisms with a total length of 1,000 - 1,200 ft. For planning purposes, the Contractor shall assume that said sampling will be designated either for the entirety of Zones A through F (approximate length 1,200 ft) in Reach 3 or some contiguous portion of Zones A through D (approximate length 3,500 ft) in Reach 2. Although the legends indicate planned dredge depths for the various dredge prisms ranging from 2 - 8 ft, the Contractor shall further assume that core sampling shall be carried out to a sediment depth of 8 ft or refusal, whichever comes first.

The following supplemental tasks detail the additional work to be conducted under Phase 1 of this work assignment. The tasks are numbered consecutively as a continuation of the tasks listed above from the original SOW. All work shall be completed by 6/22/2010, the end date for the base period of this contract.

Task 12. Development of Supplemental Work Plan

The Contractor shall develop Technical and Financial Work Plans for this supplemental work. The Technical Work Plan shall build on the detailed description of the project provided in the Contractor's original proposal. The joint GLNPO/ORD conceptual design of the entire project included in the original SOW is made part of this supplemental SOW by reference. The supplemental Financial Work Plan shall provide detailed cost breakouts for each supplemental task. The Contractor shall submit a draft supplemental Work Plan for ORD review within 1 week of receiving a Notice to Proceed (Note: Assuming a 2/1/2010 start date, the submittal target date for the supplemental Work Plan will be 2/8/2010). ORD will review and approve/amend this deliverable within 1 additional week.

Task 13. Preparation of an Addendum to Original QAPP

The original QAPP shall be modified and updated as necessary to reflect the supplemental work specified herein. In addition to selecting and describing the methodology and equipment that will be used to collect the sediment core samples and the methods and SOPs that will be employed to analyze subject samples, the QAPP Addendum shall develop and define a recommended core sampling plan. In developing this plan, the Contractor shall consider historical data and any available recent GLNPO, State, or other records to define the expected variability of sediment PCB concentrations. Historical data for the two candidate 1,000 - 1,200 ft long sampling zones described above will be of greatest importance. These data shall be reviewed for both spatial and vertical heterogeneity. Based on the findings and appropriate statistical analysis, a detailed sampling grid and approach shall be developed that specifies the recommended number of sediment cores to be collected, sampling locations (i.e., the sampling grid) for these cores within one of the two candidate zones, and the number of segments each core is to be subdivided into for analysis. The selected sampling plan shall evidence sufficient statistical power that sediment and contaminant mass removals can be reliably computed based on a comparison of pre-dredging inventories and post-dredging residuals.

As indicated above, sample cores shall be collected to a depth of 8 ft or refusal regardless of the proposed dredge prism depths shown on the legends of the current GLNPO dredge plan (see Attachment 2). Full depth

Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

cores will provide the opportunity to segment and analyze sediment intervals from sediment surface to a common sediment bottom reference in the event the dredge contractor decides to dredge to a uniform rather than staggered bottom cut line. If the dredge contractor conforms to the staggered bottom cut line plan, excess core length can be discarded.

The number of grid points to be cored shall be established based on the Contractor's statistical evaluation to minimize the effects of PCB concentration heterogeneity. For planning purposes, the Contractor shall assume that two lines of grid points shall be laid out in parallel down the length of the selected sampling zone. It is anticipated that the two lines will be set at the approximate third points bank-to-bank. It is further anticipated that the grid points will be established at 100-ft intervals longitudinally down the reach. For two lines of points laid out at 100-ft intervals, 20 - 24 sampling stations will fit within a 1,000 - 1,200 ft long sampling zone. For estimating purposes in developing its Work Plan, the Contractor shall assume that 20 8-ft long primary cores will be collected and that these 20 cores will be subdivided for subsequent chemical analysis into 300 core segments (15 per core) of varying lengths based on visual observation. The actual number of cores and core segments selected along with the final grid sampling point coordinates shall be determined following the statistical analysis of historical data referred to above.

The Contractor shall submit a draft QAPP Addendum for review by ORD within 3 weeks of receiving a Notice to Proceed (Note: Assuming a 2/1/2010 start date, the submittal target date for the draft QAPP Addendum will be 2/22/2010). ORD will review and approve/amend this deliverable within 1 additional week. The Contractor is encouraged to consult with ORD staff during the development of the core sampling plan prior to submittal of the draft QAPP Addendum to enhance the possibility that the final QAPP Addendum will be available for review by the QA Manager of the Land Remediation and Pollution Control Division (LRPCD) of NRMRL by 3/1/2010.

Task 14. Preparation of an Addendum to Original HASP

The original HASP shall be modified and updated as necessary to reflect the supplemental work specified herein. The modified language shall describe the additional safety features and considerations created by sampling sediment to depths up to 8 ft. This work may entail bringing in a specially-equipped boat and heavy sampling equipment (such as a Vibra Core Sampler) to support the collection of the desired intact core samples. Additional language may also be required to discuss any safety issues related to the provision of support to ORD in deploying and retrieving real time monitoring instrumentation.

The Contractor shall submit a draft HASP Addendum for review by ORD within 3 weeks of receiving a Notice to Proceed (Note: Assuming a 2/1/2010 start date, the submittal target date for the draft HASP Addendum will be 2/22/2010). ORD will review and approve/amend this deliverable within 1 additional week so that a final HASP Addendum can tentatively be ready for review by the NRMRL Safety Officer by 3/1/2010.

Task 15. Collection of Sediment Core Samples

The Contractor shall implement the endorsed core sampling plan described in the QAPP Addendum of Task 14. In addition to collection of the primary core samples, the Contractor shall collect duplicate core samples at three of the designated grid sampling locations. Sufficient material shall be collected for the primary cores to facilitate one set of analyses on each homogenized core segment (possibly as short 3 - 6 in.). Sufficient material shall be collected for the duplicate cores to facilitate two sets of analyses on each homogenized core segment (possibly as short 3 - 6 in.). The GPS equipment used to set the core sampler over the designated grid sampling points shall be capable of matching specified coordinates in the x-y (horizontal) plane within 10 cm and in the

Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

z (vertical) plane within 5 cm.

The collected cores shall be kept intact and transported to a suitable Contractor facility for refrigerated storage until such time as a Contractor/ORD team can jointly inspect the cores and determine core segmentation intervals. For the primary cores, core inspection and segmentation will not occur until after dredging has been completed in the sampling zone. Said inspection and segmentation tasks and follow-on analysis will likely take place in Summer 2010 on another contract venue and not on this work assignment. For the duplicate cores, inspection and core segmentation shall occur within 1 - 2 weeks of sample collection. The duplicate core segments shall be homogenized and one-half of each homogenized sample analyzed immediately to meet the method holding time for PCBs and PAHs of = 40 days. The second half of each homogenized duplicate core sample shall be set aside for analysis at the same time as the primary cores are analyzed (i.e., > 40 days holding time) on another contract venue.

Core sampling shall be initiated approximately 15 days prior to the onset of dredging. Based on the tentative dredging start date set by GLNPIO of 4/15/2010, core sampling shall be initiated on or around 4/1/2010. Assuming 10 days will be required to implement the core sampling plan, sampling should be completed approximately 5 days prior to the start of dredging. It is the Contractor's responsibility to ensure that sampling is completed prior to dredging initiation.

Task 16. Analysis of Sediment Core Samples

Only that half of the duplicate homogenized sediment core segment samples designated for analysis at a holding time = 40 days shall be analyzed on this work assignment. It is anticipated the number of core segments that will be created by subdividing the three duplicate cores will be 40, i.e., 13 - 14 per core. The Contractor shall conduct the following suite of analyses on these 40 samples using methods approved in the original QAPP (QAID 163-Q17-0):

- | | | |
|-------------------------------------------|------------------------------|----------------------------------|
| 1. PCB Individual Congeners | 5. Total Organic Carbon | |
| 2. PCB Homologs | 6. Moisture Content | 3. PCB Aroclors (10% of samples) |
| 7. Particle Size Distribution | | |
| 4. PAHs (16 priority plus alkylated PAHs) | 8. Wet and Dry Bulk Density* | |

* Methods for wet and dry bulk density will need to be added to the QAPP Addendum (QAID 163-Q17-1). They were not included in the original QAPP (QAID 163-Q17-0).

The Contractor shall complete all supplemental analyses including data reduction and recording by 6/1/2010.

Task 17. Provision of Support for Real Time Monitoring Activities

ORD plans to utilize real time monitoring instrumentation to generate continuous information on river conditions in areas near the selected sampling grid. All instrumentation will be provided by ORD. The Contractor shall provide logistical support for deployment and retrieval of ORD's real time monitors including installation of buoys and other attachment devices, installation and securing of instrumentation, calibration and adjustment of instruments and recorders as needed, and retrieval of same. The Contractor may be asked to provide a suitable boat to assist in deployment and retrieval.

Deployment activities will take place prior to the start of dredging, possibly coinciding with implementation of the sediment core sampling plan. Retrieval of some instrumentation is anticipated after several weeks of

Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

monitoring and just prior to initiation of dredging, while other instruments may be left in place for a longer period of time provided doing so does not interfere with dredging operations. For estimating purposes, ORD anticipates needing approximately 80 hours of logistical support service during April and May of 2010.

Task 18. Preparation of Monthly Progress Reports

The Contractor shall add a discussion of technical progress, problems encountered, resolution of said problems, the latest data results, and cost expenditures related to the supplemental tasks summarized above to the quarterly reports already being submitted (by the 20th of each month) under the requirements of the original Work Plan. These reports shall continue to the end of the project period on 6/22/2010.

Task 19. Preparation of Final Data Report

The Contractor shall incorporate a summary of all data generated under the supplemental Work Plan (Mod. 1 to WA 0-11) into the final data report specified and prepared under the original Work Plan for prior tasks. Tabular and graphical formats shall be utilized for data presentations as appropriate. The original final data report will have been completed prior to incorporation of supplemental results. The Contractor shall submit the updated draft final data report for ORD review by 6/8/2010. ORD will review the updated draft report, request changes as needed, and return same for corrections to the Contractor by 6/15/2010. The Contractor shall submit the corrected updated final data report to ORD for review and approval by 6/22/2010.

PERIOD OF PERFORMANCE FOR SUPPLEMENTAL WORK

Modification 1 to this work assignment will begin on the date U.S. EPA's Contracting Officer issues a Notice to Proceed to the Contractor and will extend through 6/22/2010.

LEVEL OF EFFORT

The additional work summarized in this supplemental SOW is estimated to require 874 hours of professional labor to complete.

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Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

II. Co-Alternate Work Assignment Managers

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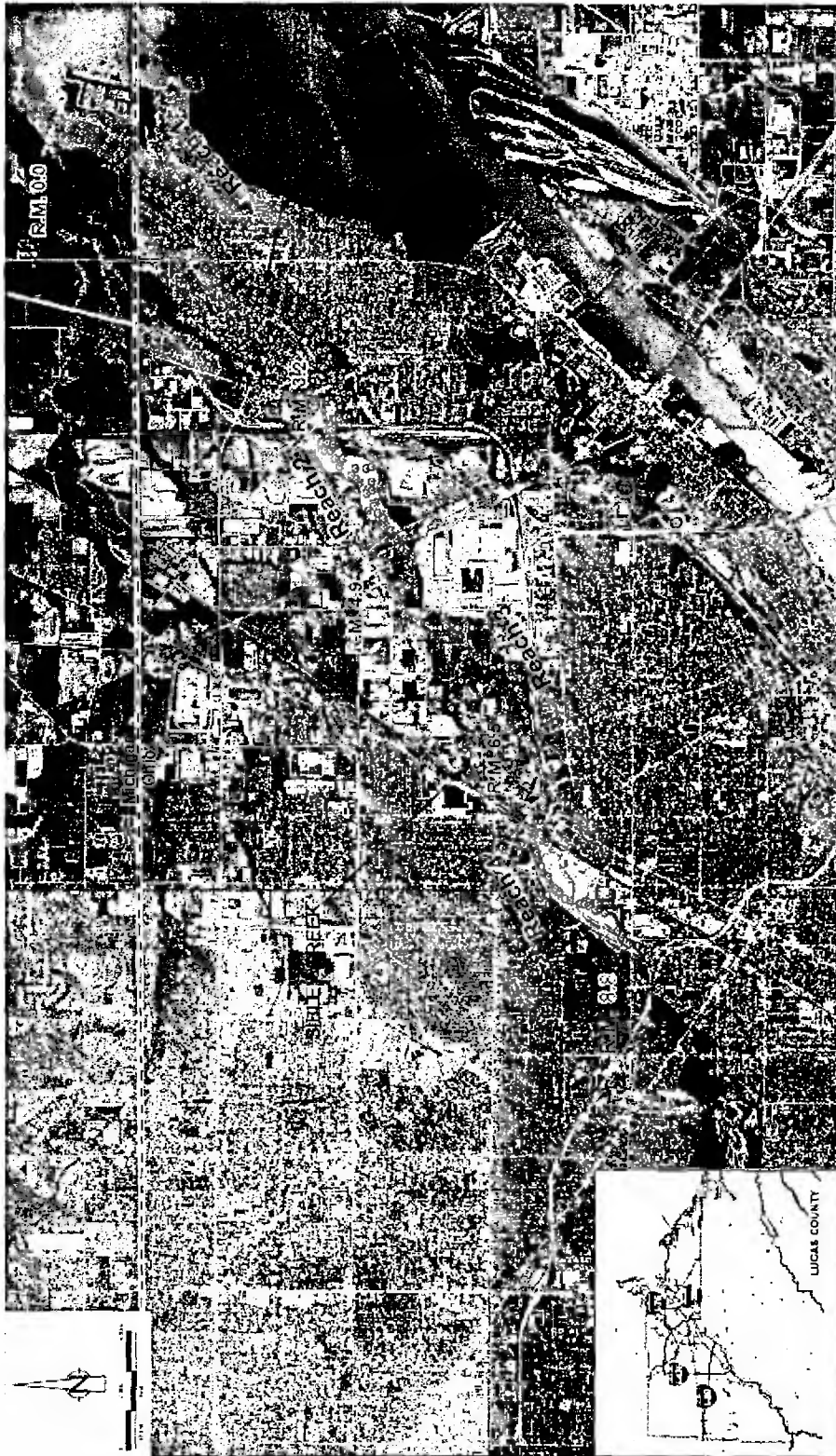
Revised SOW for Amendment #3

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0003

Attachment 1. Ottawa River GLLA Project Overview Map Showing
River Mile Delineations for the Four Reaches

Attachment 2

Ottawa River GLLA Maps of Tentative Dredge
Management Units for Reaches 2, 3, and 4



**Attachment 1. Ottawa River GLLA Project Overview Map Showing
River Mile Delineations for the Four Reaches**

Attachment 2

**Ottawa River GLLA Maps of Tentative Dredge
Management Units for Reaches 2, 3, and 4**

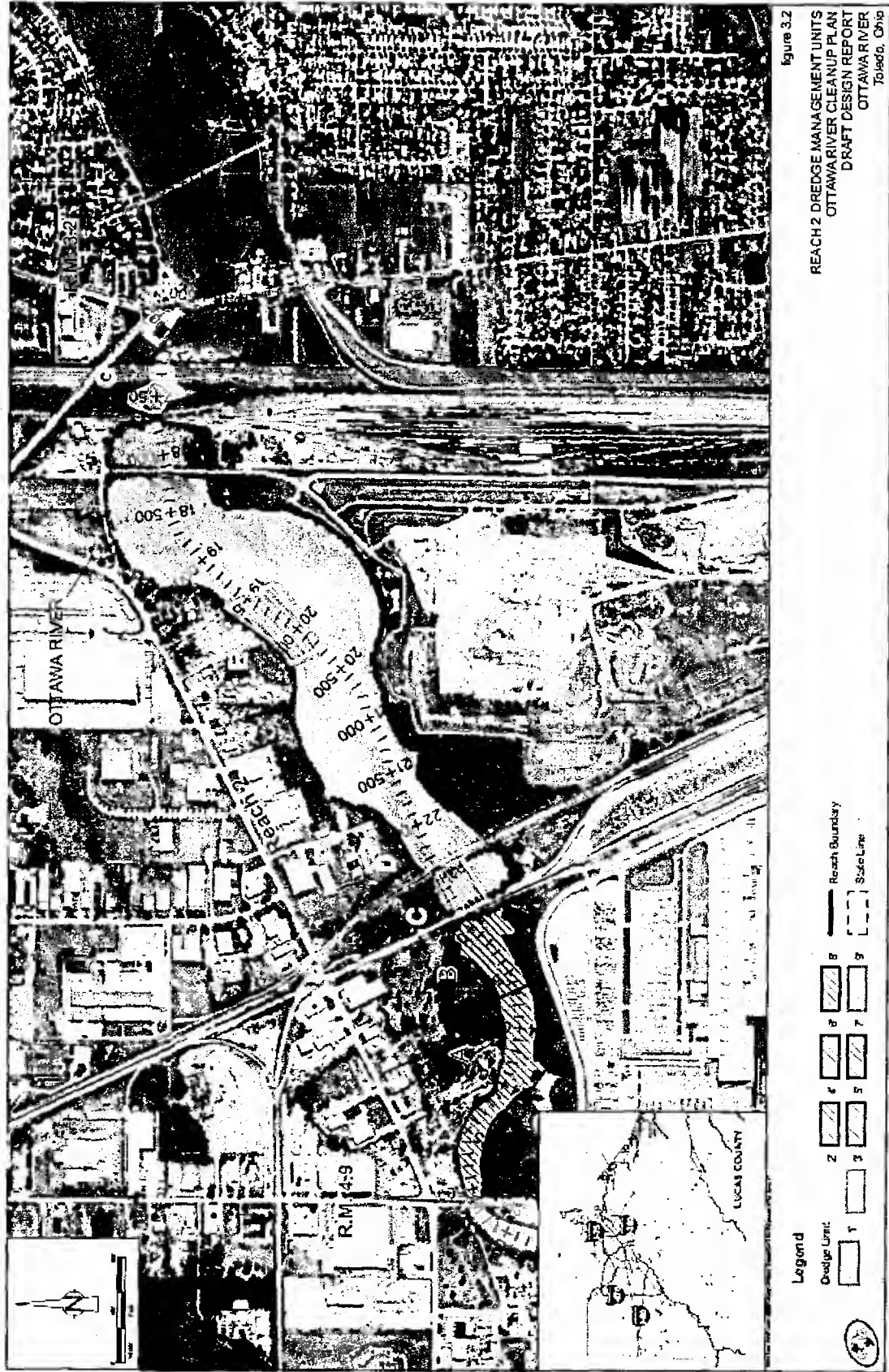


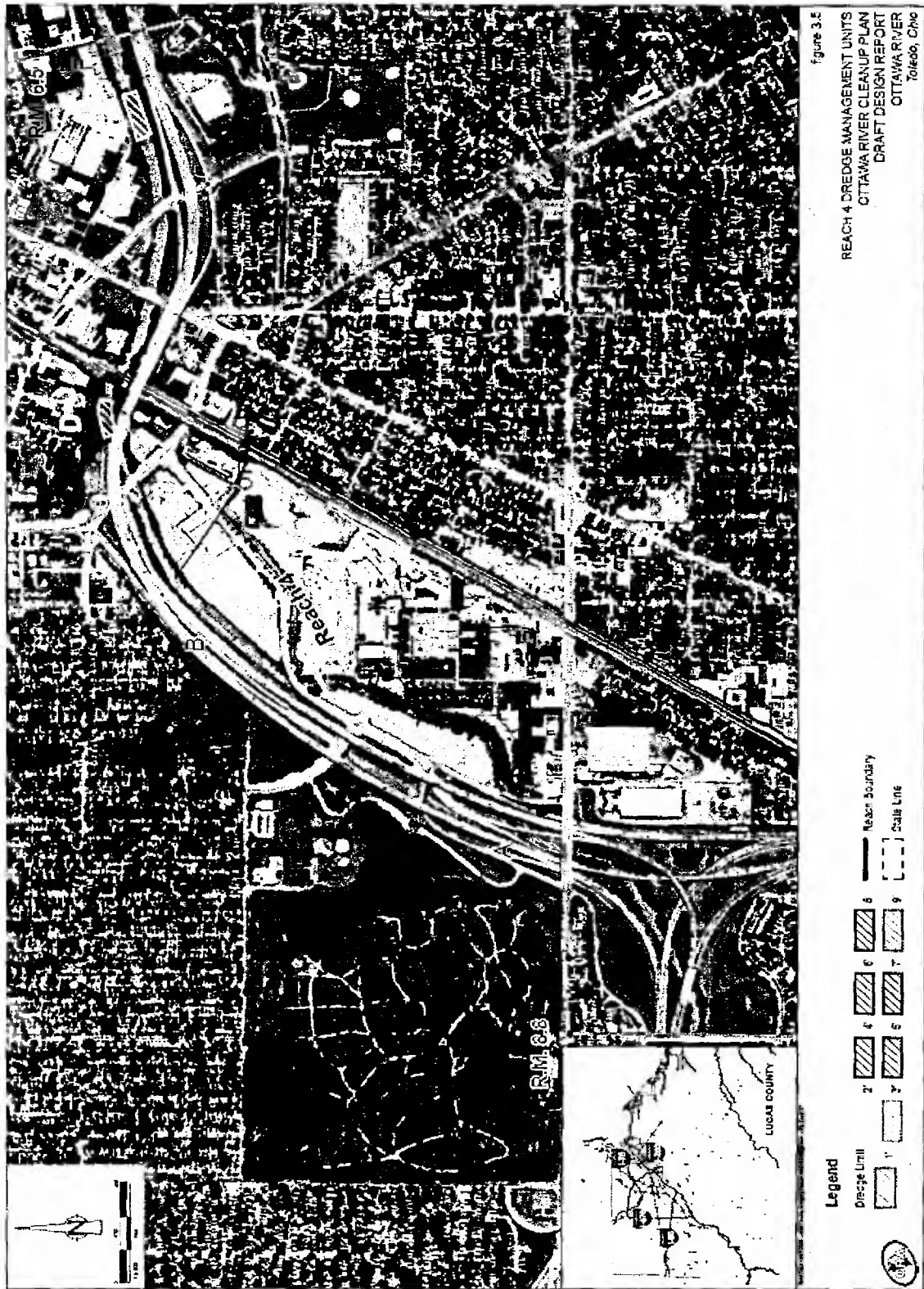


Figure 3.3
 UPPER REACH 3 DREDGE MANAGEMENT UNITS
 OTTAWA RIVER CLEANUP PLAN
 DRAFT DESIGN REPORT
 OTTAWA RIVER
 Toledo, Ohio

Legend

Dredge Unit: 1, 2, 3, 4, 5, 6, 7
 Reach Boundary
 City Line





United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-1

Work Assignment

☐ Original ☒ Amendment Number: 2Contract Number
EP-W-09-024Contract Period
Base X

Option Period Number

Title of Work Assignment
Evaluation of Environmental Dredging in the
Ottawa RiverContractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
Tasks 1 & 3Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 08/13/09

To: 02/15/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 15 October 2009, at a cost of \$325,624.00. Currently, there are 2,381 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:
Previously ApprovedCost/Fee
\$0.00LOE
2,167

This Action

\$345,624.00

214

Total

\$345,624.00

2,381

Work Plan / Cost Estimate Approvals

Contractor WP Dated : 10/15/09

Cost/Fee: \$325,624.00

LOE: 214

Cumulative Approved:

Cost/Fee: \$345,624.00

LOE: 2,381

Work Assignment Manager Name

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Phone Number (513) 569-7620

Fax Number

(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

Contracting Official Name

CHRISTINE EDWARDS

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

Evaluation of Environmental Dredging in the Ottawa River

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0002

Summary Information

Title: Evaluation of Environmental Dredging in the Ottawa River
Period of Performance: From: 08/13/09 To: 02/15/10
Award Date: 08/13/09
Total Funding:

WA Totals

The following item(s) have been added:

Category	POP	Amount
Estimated Cost	Base Pd.	\$ (b)(4)
Fixed Fee	Base Pd.	

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 2167 to 2381.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number
0-11

Work Assignment

☐ Original ☒ Amendment Number: 1

Contract Number
EP-W-09-024

Contract Period
Base X Option Period Number

Title of Work Assignment
Evaluation of Environmental Dredging in the
Ottawa River

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
Tasks 1 & 3

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance
From: 08/13/09 To: 02/15/10

Comments:
The Work Plan dated 04 September 2009, is rejected. Please see page 2 for revisions that are required for the revised Work Plan. While the revised Work Plan is being prepared, work shall continue as ordered by the Contracting Officer, Christine Edwards, via email on 21 September 2009.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$0.00	2,167
This Action	\$0.00	0
Total	\$0.00	2,167

Work Plan / Cost Estimate Approvals

Contractor WP Dated:	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee: \$0.00	LOE: 2,167

Work Assignment Manager Name
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Branch/Mail Code MS-190
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(Signature) (Date)

Other Agency Official Name

Branch/Mail Code
Phone Number
Fax Number

(Signature) (Date)

Contracting Official Name
CHRISTINE EDWARDS

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Fax Number

(Signature) (Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

Evaluation of Environmental Dredging in the Ottawa River

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 0001

Summary Information

Title: Evaluation of Environmental Dredging in the Ottawa River
Period of Performance: From: 08/13/09
To: 02/15/10
Award Date: 08/13/09
Total Funding:

Attachments

The following item(s) have been added:

Attachment Name

Changes required for revisions to WP to WA 0-11 dated 04 SEP09

Changes required for revisions to WP to WA 0-11 dated 04 SEP09

Contract: EP-W-09-024, Work Assignment: 0-11, Amendment: 001

1. U.S. EPA has been informed by the Contractor's project lead that certain analyses for sediment samples that will be collected during the second sample retrieval period in early October 2009 were inadvertently omitted from the Financial Work Plan. The Contractor shall modify its Financial Work Plan to include the conduct of Total Organic Carbon, Moisture Content, and Particles Size Distribution analyses on the 18 sediment samples collected during the second sample retrieval phase of this work assignment, nominally 10/4/09 to 10/7/09.

2. During the most recent field trip to the project site, the site was vandalized including the theft of project equipment. To avoid a repeat of this situation, a decision has been made to provide security for those days when equipment and boats are left overnight on site during those hours that project staff are not on site, nominally from 7:00 PM to 7:00 AM. The Contractor shall subcontract for appropriate security for these 12 hours during each day when the above conditions will occur. Said security shall be provided for the remainder of the field trips planned to complete this work assignment, nominally from 9/21/09 to 9/26/09 and 10/3/09 to 10/7/09.

3. U.S. EPA/NRMRL commits to making available a scientist who is an expert in SPMD technology to assist with the retrieval of 18 SPMG racks and 18 SPMD water column cages on Task 4 during the planned retrieval time for these devices, nominally from 9/22/09 through 9/26/09. The Contractor is hereby directed to reduce its Financial Work Plan LOE estimate (and associated cost) by an equivalent amount of LOE as will be provided by the NRMRL scientist.

4. U.S. EPA/NRMRL believes that the combination of Program Management proposed by the Contractor for general work assignment management (unnumbered task at \$28,648) plus operations project management (Task 12.0 at \$25,914), the combination of which by our calculations equates to 18.2% of total project cost before Program Management costs are added in or 15.4% of total project cost after Program Management costs are added in, is excessive. It is requested that the Contractor rethink the need for this much program management effort with the goal of reducing the estimated LOE and associated cost by an amount that does not jeopardize effective management of the project.

The estimated cost of these changes shall be incorporated in the overall Financial Work Plan for Items 1, 3, and 4 above. A separate cost estimate for Item 2 shall be submitted as an option that if exercised by the Government will accrue to the total project cost.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number
0-11

Contract Number
EP-W-09-024

Contract Period
Base X

Option Period Number

☒ Original ☐ Amendment Number:

Title of Work Assignment
Evaluation of Environmental Dredging in the
Ottawa River

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
Tasks 1 & 3

Purpose: ☒ Work Assignment Initiation ☐ Work Assignment Close-Out
☐ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/13/09

To: 02/15/10

Comments:

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 3)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period: Cost/Fee LOE

Previously Approved

This Action

Total \$0.00 2,167

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: \$0.00 LOE: 2,167

Work Assignment Manager Name

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Branch/Mail Code MS-190

Phone Number (513) 569-7620

Fax Number

(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

Contracting Official Name

CHRISTINE EDWARDS

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

Evaluation of Environmental Dredging in the Ottawa River

Contract: EP-W-09-024, Work Assignment: 0-11

Summary Information

Title: Evaluation of Environmental Dredging in the Ottawa River
Period of Performance: From: 08/13/09 To: 02/15/10
Award Date: 08/13/09
Total Funding:

Procurement Management Roles

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STATEMENT-OF-WORK

CONTRACT NUMBER: EP-W-09-024

WORK ASSIGNMENT NUMBER: 0-11 (Performance Based)

TITLE: Joint U.S. EPA GLNPO/ORD Project for Evaluation of Environmental Dredging for Remediating Contaminated Sediments in the Ottawa River, Pre-Dredging Characterization Phase

PROJECT ADMINISTRATOR: U.S. EPA Office of Pollution Prevention and Toxics (OPPT), Washington, DC

PROJECT CONTRACTOR: Battelle Memorial Institute, Columbus, OH

INTRODUCTION

I. Historical Formation of Project Partnership

The Chicago-based Great Lakes National Program Office (GLNPO) of the U.S. Environmental Protection Agency (U.S. EPA) is mandated under the Great Lakes Legacy Act (GLLA) of 2002 to undertake and oversee the clean up (i.e., remediation) of contaminated sediments in the Great Lakes area. Clean-up actions are supported by a combination of GLLA funding to a maximum of 65% of the project remediation cost and non-Federal stakeholder funding at a minimum of 35% of the project remediation cost (plus 100% of operations and maintenance costs).

The National Risk Management Research Laboratory (NRMRL) of U.S. EPA, located in Cincinnati, sponsors and carries out a comprehensive national research program on contaminated sediments. U.S. EPA's Cincinnati-based National Exposure Research Laboratory (NERL) conducts a broad range of field studies related to the impacts of contaminated sediments on ecological receptors such as macrobenthic, plankton, and indigenous fish populations. NRMRL and NERL have collaborated previously on a long-term evaluation of Monitored Natural Recovery (MNR) at the Twelvemile Creek/Lake Hartwell Superfund Site in Pickens County, SC. The Twelvemile Creek/ Lake Hartwell Site was contaminated with polychlorinated biphenyls (PCBs) from many years of discharges from a capacitor manufacturing plant. This study has developed tools for monitoring physical, chemical, and biological indicators of recovery in the sediment, water column, and food web.

The tools developed and optimized at Lake Hartwell were put to further use in a joint NRMRL/NERL project with GLNPO carried out on the Ashtabula River in northeastern Ohio in 2006 – 2007. Sediments in the Ashtabula River were contaminated with a mixture of PCBs, PAHs, and metals, although PCBs were the risk driver. Sediment contamination in the Ashtabula River resulted primarily from industrial discharges to tributary Fields Brook. The remedy selected by GLNPO for this site under the GLLA was environmental dredging of a one-mile stretch of the river. NRMRL/NERL and GLNPO, under OPPT Contract No. EP-W-04-021,

Work Assignment No. 2-11 cooperated in conducting a comprehensive pre-dredging characterization project (Phase 1) of the site in 2006 with data reporting completed in early 2007. NRMRL and NERL continued their study of the Ashtabula River in 2007 and 2008 with a multi-faceted evaluation of remedy effectiveness and sediment residuals during the active dredging phase (Phase 2) and following the completion of dredging (Phase 3) under NRMRL Contract No. EP-C-05-057, Task Order No. 50. During these latter two phases, GLNPO conducted its own effectiveness evaluation using criteria and requirements specified in the GLLA. NRMRL/NERL follow-up testing to document long-term recovery effectiveness is continuing in the summer of 2009; additional out-year testing is also anticipated in the near term.

NRMRL/NERL and GLNPO are proposing to extend their recently-formed relationship in monitoring and evaluating a second environmental dredging project, this time on the Ottawa River in Toledo, OH. For the purposes of describing this project, NRMRL and NERL will hereafter be referred to as ORD (U.S. EPA Office of Research and Development). The remedial zone is the lower (northern-most) 8.8 miles of the Ottawa River just before it discharges into the Maumee River Drainage Basin, which in turn discharges into Lake Erie. The Ottawa River is contaminated with PCBs, polycyclic aromatic hydrocarbons (PAHs), and inorganics (primarily lead) from numerous industrial outfalls, combined sewer overflows (CSOs), storm sewers outfalls, and landfill leachate drainage sited along both banks. PCBs and lead are the risk drivers for this site.

The Ottawa River evaluation study will be pursued jointly between ORD and GLNPO via two consecutive work assignments. This first work assignment (0-11) will pre-characterize certain aspects of the river this summer prior to active dredging. Although dredging of some "hot spots" may be initiated in the last quarter of 2009, the primary dredging program is scheduled to commence next spring and continue throughout the remainder of 2010. Although the remedial site is depicted as four reaches stretching over 8.8 miles (Figure 1), dredging will be carried out only in selected zones within Reaches 2, 3, and 4 (a distance of 5.6 miles). No dredging will occur over the last 3.2 miles (Reach 1) of the Ottawa River before it discharges into the Maumee River Drainage Basin. This work assignment will be restricted to analyzing a prescribed set of sediment and water chemistry samples and conducting biological indicator tests on macroinvertebrates, passive surrogate samplers, and indigenous fish in the August - October timeframe.

A second collaborative work assignment between ORD and GLNPO is planned to commence prior to the primary dredging effort. This effort will consist of a comprehensive and extensive program to characterize the site just prior to dredging, during dredging, and immediately following dredging. The post-dredging evaluation may not be completed until 2011, depending on the rate of dredging progress. Preliminary efforts are anticipated to begin on this second work assignment in the last quarter of 2010 for planning purposes and QAPP and HASP preparation.

The project description to follow details the approach to be pursued in conducting the entire project, including both work assignments. The description of tasks at the end of this Statement-of-Work (SOW) are specific to the summer 2009 (WA No. 0-11) work only.

II. Purpose of the Entire Project

As described above, this research is a joint effort of GLNPO and the combined ORD entities of NBRMRL and NERL. GLNPO, via its GLLA mandate, and ORD, through its research mission, have mutual interests in evaluating the efficacy of environmental dredging. Toward that end, the two organizations have agreed to a comprehensive joint research effort on the Ottawa River Dredging Project. This partnership will conduct research in the development and evaluation of an approach to measure remedial efficacy of environmental dredging that will include extensive sampling and analysis before, during, and after dredging operations to measure sediment residuals and the impact of remedial operations and sediment removal on the river ecosystem.

The remediation of contamination within rivers and other water bodies often involves the dredging of bed-sediment. Dredging, whether used alone or in conjunction with other treatment technologies such as *in-situ* capping or natural recovery, can result in the loss and release of contaminated sediments. These residual sediments (hereafter referred to as 'residuals') can spread from both within dredged areas (near field) and downstream or off site (far field). There are a number of factors that may influence residual levels including: dredging equipment; operator technique; debris; dredging to bedrock; over-dredging; cut lines, slopes, and depths; sediment characteristics; contaminant characteristics and distribution; and the accuracy and resolution of contaminant characterization. Residuals can be categorized as either undredged or dredge-generated. Undredged residuals are the result of missed areas and incomplete characterization. Dredge-generated residuals are released via resuspension, transport, and downstream deposition; dredge mixing and immediate deposition; and cut face/slope sloughing.

The results of the data collection and analyses proposed in this proposed research plan will provide insight into an approach for evaluating remedy effectiveness and advance the development of predictive tools to quantify mechanisms responsible for dredge residuals. These methods will be used to obtain more realistic estimates/projections of post-dredging contaminant concentrations based on pre-dredging information and data. More specifically, the project goals are as follows:

- 1) Generate baseline chemical and biological data for U.S. EPA ORD in support of clean-up operations.
- 2) Evaluate extent of dredged residuals by measuring chemical concentrations in sediments and biota prior to dredging to compare with 'during' and 'post-dredging' sediment concentrations to determine whether a relationship exists between those pre-dredging concentrations and dredge-generated residuals.
- 3) Perform biological studies to evaluate the immediate impacts of contaminant removal on ecosystem measures of health and the long-term ecosystem changes in response to dredging.
- 4) Develop chemical, physical, and biological tools to support the development of an approach, or strategy, using standardized tools to evaluate the efficacy of remedial activities.

As part of this study, data will be generated in three phases:

- Phase 1 – Measurements conducted prior to dredging
- Phase 2 – Measurements conducted during dredging
- Phase 3 – Measurements conducted post-dredging.

III. Site Description

The Ottawa River lies in extreme northwest Ohio, flowing into Lake Erie's western basin at the City of Toledo (Figure 1). The Ottawa River is a component of the Maumee River Area of Concern as defined by the International Commission. The Ottawa River is approximately 45 miles long; however, the current proposed Ottawa River Cleanup addresses only the portions of the lower 8.8 miles of the river (defined as the Lower Ottawa River) where urban and industrial activities have had a detrimental impact on the river as a beneficial resource. In addition to the significant alterations to the physical aspects of the river and its extensive rechannelization, dredging, and bank alterations, widespread influxes of contaminants have resulted in significant degradation of the water, sediment, and ecological habitat quality in this lower river. The primary contaminants-of-concern (COCs) at the site are PCBs, PAHs, inorganics (principally lead), and oil and grease.

The targeted remedial site has been divided into four reaches (Figure 1). Reach 1 starts at River Mile (RM) 0.0 to proceeds southerly to RM 3.2, Reach 2 from RM 3.2 to RM 4.9, Reach 3 from RM 4.9 to RM 6.5, and Reach 4 from RM 6.5 to RM 8.8. The lower 6 miles of the Lower Ottawa River is considered a lacustrine system and is subject to flow reversals due to seiche events on Lake Erie. From Reach 4, the river generally widens as it moves downstream to RM 0.0. The steepest and most channelized sections exist in Reach 4 (average 75 ft width) that tends to exhibit the greatest flow velocities and erosive conditions. Multiple storm sewers and CSOs discharge to the river along Reach 4. Reach 3 is a transitional reach (average 130 ft width) with Reaches 1 and 2 being very broad, flat, and slow moving. Reach 3 is highly impacted by three major landfills along the lower two-thirds of this section. These modifications along with road placement and other fill activities have resulted in extensive channel modification and armoring. Due to the lower gradient and subsequent lower flow velocities, Reach 3 is intermittently depositional in areas. Reaches 1 and 2 are very broad (Reach 2 averages 600 ft in width). These lower two Reaches are most subject to seiche effects; however, flow reversals have been observed through Reach 3. Though very wide in these reaches, there are road and rail crossings that reduce the river cross section and result in both higher local velocities and backwater effects during some flow events. These conditions are evident in Reach 2, and thick sediment accumulations are evident in the Stickney Avenue Depositional Zone (SADZ) at the upper end of this reach. The SADZ appears to have trapped a large portion of the contaminated sediments transported to this reach from upstream portions of the river. In Reach 1, the river widens (over 1000 ft wide) and water depths are shallowest and highly subject to wind-driven waves and currents, which are induced by Lake Erie seiches. Reach 1 also receives significant recreational boat traffic resulting in turbulence and resuspension. The resuspension of sediments by wind and waves, flushing by seiche events, and storm flows contribute to the dispersion of sediment in these areas.

Approximately 260,000 yd³ of contaminated sediments are targeted for removal between RM 8.8 and RM 0.0. The COCs in this stretch of the river include PCBs, PAHs, metals (principally

lead), and oil and grease. Removal will be accomplished through environmental dredging in targeted areas in the river to established cut lines. These cut lines were established to reach specific post-cleanup and final goals (summarized on page 9) for the remedial project area.

OBJECTIVES OF THE ENTIRE PROJECT

The overall objectives of this research effort are twofold:

- 1) Develop chemical, physical, and biological tools and approaches to evaluate the quantity and sources of post-dredge residuals.
- 2) Develop an approach to quantify remedial effectiveness.

These goals, jointly shared by GLMNPO and ORD, are complementary and will ultimately be integrated in this project.

CONCEPTUAL DESIGN OF ENTIRE PROJECT

The conceptual design of this project has been developed to address the above two overall project objectives. The approach to addressing these objectives and associated issues are described in detail below as a series of overall sub-objectives related to the entire project (i.e., both this work assignment [WA No. 0-11] involving ecosystem pre-characterization sampling and analysis in Summer 2009 as well as the planned work assignment to be initiated in Fall 2009 that will evaluate remedial effectiveness with intensive sampling and analysis immediately before, during, and immediately after environmental dredging). These conceptual sub-objectives, which are discussed here for general information, are not to be confused with the operational tasks necessary to carry out WA No. 0-11. The operational tasks for WA No. 0-11, the implementation of which constitute the Contractor's responsibility for this work assignment, are detailed at the end of this SOW.

Objective 1 – Evaluate Quantity and Sources of Post-Dredge Residuals

Sub-objective 1.1. Core Profiling and Chemistry

With regard to dredge residuals, two primary sources of residual contamination are left behind following an environmental dredging project. These sources are divided into dredged residuals and undredged residuals. The undredged residuals are generally considered contaminated sediments that have been missed during dredge operations either due to not dredging to the targeted cut line or inadequate dredge pass overlaps. The second category of residuals, dredged residuals, are generally accepted as materials that have been resuspended during dredge operations and have either settled back or flowed back into the dredge cut. The objective of this research is more focused toward dredged residuals, though adequate characterization of undredged residuals will be necessary to define the full extent of dredge residuals.

There are two generally accepted means of approximating dredged residuals following an environmental dredging project: 1) dredged residual contaminant concentrations approximate the

pre-dredging weighted average contaminant concentration in the entire overlying sediment column, and 2) dredged residual contaminant concentrations approximate the pre-dredging weighted average contaminant concentration in the final cut depth (which also is influenced by previously dredged sediments and may be cumulative).

An ORD sampling strategy will be developed as part of project work plan and designed to generate the necessary data to determine whether these two general rules can be resolved and to specifically address the following two questions:

- Are generated residuals influenced by the vertical and lateral distribution of contaminants in the sediment bed, and can detailed characterization be used to develop a relationship between the pre-dredging vertical and lateral distribution of contaminants (i.e., PCBs) in sediments and the concentration of contaminants in dredge-generated residuals?
- Should generated residuals be calculated over impacted areas rather than by point-by-point analysis? The former requires the collection of multiple sediment cores and an understanding of the three-dimensional distribution of contaminants in the sediment bed. Single-point sediment cores, while less expensive to pursue, may inadequately characterize dredged areas.

Statistical data analysis methods will be used to evaluate and compare two distinct populations: pre-dredging sediment cores and post-dredged residuals. Statistics will also be used to compare dredge cuts in distinct layers over designated areas vs. dredging to a target depth in one continuous dredge cut before moving the dredge barge to a new adjacent location. A variety of statistical approaches including analysis of variance (ANOVA), principal component analysis (PCA), correlation analysis, and regression analysis may be used to elucidate patterns in the data that are not immediately evident based on visual observation. Statistical methods will also include estimating vertical and horizontal spatial variability to evaluate and compare pre- and post-dredging sediment mass and concentration data. These spatial methods, which include semi-variogram (kriging) analyses and correlation matrices, will provide insight into the relationship between residual sediment concentrations to pre-dredging concentration distributions and contaminated mass removed.

Data analysis will address both total PCB and congener distributions to determine if residual concentrations represent measurable congener shifts from high-molecular weight compounds to low-molecular weight compounds with sediment depth. In addition, residual sediment congener distributions will be compared to congener distribution throughout the sediment column to identify which portions of the sediment column most directly influence residuals.

To determine representative concentrations for a given core, sediment cores will be divided into multiple sections. Statistical analyses will be applied to each respective section or multiple sections. For example, if 9 ft of sediment is dredged in three, 3-ft sections, representative averages for that core will likely include the top, middle, and bottom subsections, the average of the entire 9 ft, and other combinations of the subsections. Single core averages, area averages, and volumetric averages that incorporate multiple cores (and subsections) will be calculated as a function of distance downstream to identify and characterize spatial correlations that may be present.

Sub-objective 1.2. Sediment Tracer Study

A second means of characterizing dredged residuals will be evaluated as part of this research project. Sediment tracers have been used in limited application over the last several decades. The majority of these applications have been limited to either shoreline migration or erosion studies or dredge spoils disposal. The approach being considered for this study involves fluorescent labels coated onto fine grain sediments from the site. These tracers are then used to identify the movement of sediment once applied to specific locations. The characteristics of the fluorescent labels allow very low levels to be detected in the bed sediment or suspended sediment.

Two related studies are anticipated to characterize the dredged residuals. The first application will be to distribute a unique fluorescent tracer on the sediment bed in an area prior to environmental dredging. The sediment will then be dredged as part of standard removal operations, and sampling with the dredge prism and down gradient of the dredge prism will be conducted. It is anticipated that a fraction of the labeled particles will be removed during dredging with some of the tracer being suspended during dredging or missed and left behind. Samples will be collected both during and following dredging operations in the study area. The surface sediment sampling will be conducted immediately after a dredge cut has been completed. Sediment traps will be deployed down gradient and sampled both during and following dredging operations to evaluate the off-site migration of resuspended materials.

The second study will be conducted to create a plume of fluorescent labeled particles at the dredge head and then monitor for the transport and deposition of materials out of the dredge prism during active dredging. It is anticipated that some of the suspended sediment during a dredge operation will be redeposited with the dredge prism, but some of it may be transported down gradient depending on particle characteristics and flow velocities. This effort will focus on evaluating the redeposition of suspended sediment back into the dredge prism and also characterize the off-site transport of suspended sediment.

The sediment tracer effort will utilize multiple fluorescent tracers, sediment sampling, sediment traps, and water velocity profiling. Where sample mass will allow, samples will be split for fluorescence analysis and PCB chemistry analysis as will be carried out on the rest of the sediment samples from this project. The primary interference to this type of analysis is any background fluorescence of the same wavelengths as the labeled fluorescence in the sediment or the sediment contaminants.

Sub-objective 1.3. Field Analysis to Characterize Metals

In a companion effort to the *Core Profiling and Chemistry* effort discussed in *Task 1.1* above, inorganic metals will be used to compare methods of predicting residuals on sediment profiles before and after remedial actions. These inorganic metals will be used for a comparable forensic analysis as is proposed above for the PCBs and PAHs. It is anticipated that a "metals" fingerprint can be developed and defined in a vertical profile and thereby allow comparisons of the pre-dredge profile with the post-dredge residuals. As a cooperative effort with the U.S. Navy SPAWAR's contaminated sediments research group, we will characterize the sediment's vertical

profile for selected inorganic contaminants using portable XRF technology developed by the Navy. This technology offers several advantages over other chemistry profiling techniques traditionally employed. This XRF technology provides near real-time measurements with on-site rapid analytical procedures at very reasonable costs. This technology can be compared to the organics analyses, which are very costly (\$500-1000/PCB sample and \$200-600/PAH sample) and have turnaround times typically in the order of weeks. In addition to the portable XRF measures completed on site with the Navy collaborators, NRMRL will split out a subset of samples for more standard and complete metals analysis by ICP-MS methods. This more extensive analysis will serve to validate the XRF values, but will also allow additional metals to be quantified.

Sub-objective 1.4. Subsurface Profile Imaging to Characterize Residuals

Subsurface profile imaging (SPI) has been a growing area of research in the contaminated sediments field. Our research partner at ORD's National Health and Environmental Effects Research Laboratory (NHEERL) has developed a SPI camera system that will be deployed before and after dredging. The system consists of an imaging camera secured to a deployment platform. Once lowered to the sediment surface, the camera prism is lowered into the sediment approximately 8-9 in. and an image is captured. Though this technique has been used primarily in the development of alternative approaches to benthic surveys, we are also evaluating the approach for characterizing shallow deposits of residual contamination. This direct measure of residuals can prove useful in situations where redeposition of suspended materials provides clear visual demarcations from the undredged materials.

Objective 2 – Quantify Remedy Effectiveness

The second part of this project will be focused on evaluating specific tools to develop an approach to quantify remedy effectiveness following an environmental dredging project. This approach generally will be divided into three components: 1) recovery of surface sediment concentrations immediately following remedial actions and over time, 2) the response and recovery of biological indicators during and following remedial activities, and 3) passive samplers as surrogates to biological indicators. Since this research project is limited to environmental dredging and specific COCs, this approach will be proposed and developed on a site-specific basis but with considerations toward developing a more universal approach to be applied on sediment remediation projects in general.

Sub-objective 2.1. Surface Sediment Concentrations

This effort will be led by GLNPO under a separate work assignment. The effort involves the collection of surface sediment samples throughout the sediment remedial area to develop a SWAC. Using this surface sediment data, they will generate surface weighted averages for the entire study area. These target values are as shown below for the specific COCs.

Post-cleanup surface-weighted average concentrations of:

- Total PCB Aroclors < 1.5 mg/kg
- Total PAHs (sum of 16 compounds) < 30 mg/kg
- Lead < 180 mg/kg

Final surface-weighted average concentrations of:

- Total PCB Aroclors < 1.0 mg/kg total
- Total PAHs (sum of 16 compounds) < 22.8 mg/kg
- Lead < 128 mg/kg.

Sub-objective 2.2. Biological Indicators

Biological indicators can effectively serve as an integrator of time and space and, in some instances, can define exposure prior to the chemical and physical measurements typically used in characterizing and monitoring contaminated sediment. NERL has been actively developing a number of biological indicators to compare the effectiveness and long-term recovery of contaminated sediment remedial actions. The biological indicators efforts for this project will be focused on the following approaches: 1) PCB uptake in lower order consumers in the form of macroinvertebrates, 2) PCB uptake in short-lived adult fish, i.e., emerald shiners, 3) macroinvertebrate metrics and index of biological diversity, 4) midge and amphipod 10-day toxicity tests, 5) genotoxic endpoints in fish to evaluate DNA damage, and 6) PCB distribution and movement in the aquatic and riparian food web. These four approaches will be used to evaluate the pre-dredge condition, impacts of the remediation action itself, and post-dredge effectiveness and long-term recovery.

These indicators will be employed pre-dredging, during dredging in selected areas of the project (to be determined), as soon as possible following dredging, and in subsequent years in collaboration with GLNPO to evaluate long-term recovery.

Sub-objective 2.2a. Macrobenthos Indicators

The first effort will use benthic macroinvertebrates collected on multi-plate artificial substrates (Hester-Dendy [H-D] types) for measuring body burden levels of COCs and assessing biological integrity. These deployments will be conducted pre-dredging, during dredge operations, and post dredging. The substrates will be deployed (6-week incubations during summer) such that they are stratified across reaches within areas to be dredged and not dredged and during pre-, during-, and post-remedy periods. Where possible, substrates will be deployed at historical Ohio EPA monitoring locations to enhance trend analysis of biological integrity with two sets of 20 H-Ds located at each monitoring site. The goal is to demonstrate the utility of using body burdens in macroinvertebrates and biological integrity measures as indicators of remedy effectiveness and possibly GLLA program performance. This effort will generate baseline chemical and biological data for U.S. EPA ORD in support of clean-up operations. The biological studies will evaluate the immediate impacts of contaminant removal on aquatic

assemblage measures of health and also the long-term changes in response to dredging. An eventual goal is to transfer the technology to other contaminated sites on the Great Lakes.

Sub-objective 2.2b. Small Short-Lived Adult Fish

Small short-lived adult (SSLA) fish will be collected during the three phases of the project at locations where historical fish collections have been made within the three reaches to be dredged. Whole fish homogenates of the SSLA fish will be analyzed for PCBs and PAHs. Fish tissue PCB concentrations in other fish collected by Ohio EPA or others will be compared to the SSLA concentrations. The purpose of this indicator is to determine what fish tissue in short-lived adults is a short-term indicator of remedy effectiveness. Fish collections conducted by Ohio EPA and others will also be evaluated. If possible, in future fish collections by Ohio EPA and others, blood and livers will be assessed using NERL's Comet assay for assessing DNA damage due to carcinogen exposures.

The next two biological measures, genotoxicity and bile metabolites, will be completed on fish collected within selected remedial areas throughout the project site. Additionally, all fish will be analyzed for PCBs, PAHs, and metals. These two biological measures will be completed on brown bullheads collected by electrofishing. Fish sampling and analysis will be conducted by NERL prior to dredging, during dredging and following dredging in selected areas of the Ottawa River as well as at a control site. NERL will catch the brown bullheads throughout the Ottawa River and indicate the locations of the collected fish in reference to the remedial target areas. External lesions and abnormalities noted in the brown bullheads will be compared to DNA damage. Molecular marker studies will be carried out similar to those conducted by NERL in the Ashtabula River study. Additionally, each fish will be analyzed for DNA damage using the Comet assay. The Comet assay, also called the single cell gel (SCG) assay, is a method that quantifies DNA damage including single- and double-strand breaks, alkali labile sites, and delayed repair sites at the cell level. The Comet assay has been used for a variety of applications including environmental monitoring. Using blood cells, this assay has been developed as a sensitive marker of contaminant-caused genetic damage in fish (Meier *et al.*, 2001) and has been applied in a previous study of the Ashtabula River (Yang *et al.*, 2006). NERL personnel use the method developed by Singh *et al.* (1988). With this method, two slides are prepared for each fish and 50 cells are scored on each slide. Slides are put into a lysing solution, immersed in electrophoresis buffer to allow unwinding of DNA, and then subjected to electrophoresis and stained. Slides are observed under a fluorescent microscope, and image analysis is used to quantify tail length and % tail DNA. An additional endpoint will evaluate the bile of the collected fish for PAH metabolites. Bile will be collected using a hypodermic syringe from the gall bladder, placed in cryogenic vials, and frozen in liquid nitrogen. Bile samples will be shipped frozen in liquid N₂ Dewar flasks to a contract laboratory for analysis of naphthalene-type and benzo(a)pyrene-type metabolites using HPLC-fluorescence methodology. Total protein analysis will be performed on each sample to normalize the metabolite data.

Sub-objective 2.3. Passive Samplers

Biological indicators of persistent chemicals in contaminated sediments pose a significant challenge to quantify the exposure and toxicity. Passive samplers have been developed as an

alternative and a supplement to biological indicators. Passive samplers will be used in two approaches: 1) a relative measure of aquatic contaminant concentrations, and 2) a correlation to surface sediment biological toxicity measurements.

Sub-objective 2.3a. Passive Samplers as a Relative Measure of Aquatic Concentrations

Passive samplers are devices that rely on diffusion and sorption of the target analyte to the sampler to accumulate that analyte over time. These samplers represent a time-integrated condition at the location over the time of deployment. The accumulated mass and time of deployment are then used to calculate an analyte concentration in the sample matrix. Some of these sampling technologies are relatively mature and accepted for appropriate applications (most commonly ground water monitoring) by regulators in some regions and states. Nonetheless, passive samplers are still considered innovative technologies and few, if any, standard protocols prescribing their use have been developed or accepted.

One such passive sampler is a semi-permeable membrane device (SPMD) that utilizes a neutral, high-molecular-weight lipid, such as triolein, within a polyethylene membrane tube. These SPMDs are supplied by Environmental Sampling Technologies (EST) Inc. (St. Joseph, MO). The water column SPMDs used in this research will be deployed in the water column for 28 days and co-located with macroinvertebrate samplers and sediment toxicity sample collection to allow comparisons with these tools. Once retrieved, the samplers will be returned to the EST laboratory where the SPMDs will be dialyzed and extracted. The extracts will then be sent to Contractor laboratories where they be cleaned up analyzed for PCBs and PAHs. Additionally, water samples will be collected at the time of deployment and retrieval and analyzed for PCBs, PAHs, TSS, TOC, and turbidity.

Sub-objective 2.3b. Passive Samplers as Surrogates to Biological Indicators

In addition to the water column deployment of SPMDs (a relatively mature technique), SPMDs will also be deployed in direct contact with the sediment. The deployment approach has been developed at other contaminated sediments sites and will be used to further validate the protocol. This approach will be used to correlate SPMD uptakes with sediment contaminant concentrations, sediment toxicity, and other biological indicators measured at the site. These sediment SPMD samplers will be co-located with the water column SPMDs, exposed for 28 days, and analyzed for PCBs and PAHs. Additionally, surface sediment samples will be collected at the time of deployment and analyzed for PCBs, PAHs, TOC, moisture content, and particle size distribution.

Sub-objective 2.4. Sediment Toxicity

Sediment toxicity testing will be conducted on sediment before and after dredging. The sediment toxicity samples will be co-located with the macrobenthic collections and passive samplers. By co-locating these samples, significant cost savings for sediment chemistry can be realized as well as providing an opportunity for comparison between these techniques. From composited surface (top 6-in. core composites) sediment samples, 2 liters of sediment will be

collected at each sample location at the times of deployment and retrieval of the macroinvertebrate samplers. These samples will be returned to NERL-Cincinnati, and 10-day *Chironomus* and *Hyaella* tests will be conducted. Using *Chironomus* as a toxicity indicator may help develop better relationships among the body burden macroinvertebrate samplers, the ICI macroinvertebrate samplers, sediment chemistry, passive samplers, and sediment toxicity.

A 10-day static-renewal bulk sediment toxicity test using *Chironomus tentans* and *Hyaella azteca* will be conducted using standard U.S. EPA sediment testing methods (U.S. EPA, 2002). The tests will be conducted at $23 \pm 1^\circ\text{C}$, using 100 mL of sediment and 175 mL of MHRW as the overlying water. The control sediment will be washed grade 40 silica sand, supplemented by the addition of 1% liquid alfalfa. Each control or sediment treatment will be run using six replicate 400-mL beakers as test chambers with 10 animals in each replicate (60 organisms total per concentration). The photoperiod during testing is 16 h light:8 h dark, and a water change of two volume additions (350 mL) will be performed daily using a modified Zumwalt renewal system (Zumwalt *et al.*, 1994). Temperature will be measured on a daily basis, and routine physical/chemical parameters (pH, dissolved oxygen, conductivity, and temperature) will also be measured on initial setup (Day 0) and final takedown (Day 10) for each test concentration or control sample. The *C. tentans* and *H. azteca* used in testing will be from in-house cultures maintained at the U.S. EPA-Cincinnati facility. At the start of testing, the *C. tentans* will be third instar larvae (10 days old). The feeding regime will follow standard U.S. EPA guidance (U.S. EPA, 2000). Feeding will consist 1.0 mL YCT (yeast, trout chow, cerophyll mixture) daily throughout the duration of the test.

At the end of each test, 25 or more surviving midges and amphipods will be saved for future microarray analyses. NERL-Cincinnati is collaborating with several academic institutions to develop genomic indicators of exposure to PCBs, PAHs, and metals. The organisms for the two exposures will be placed in -80°C freezers until the microassays have been developed and then will be tested with them.

DESCRIPTION OF OPERATIONAL TASKS FOR THIS WORK ASSIGNMENT (WA No. 0-11)

A condensed set of pre-characterization tests will be conducted in Summer 2009 to characterize pre-dredging conditions for several ecosystem parameters and associated sediment and water column chemistry. Macroinvertebrate (H-D) samplers will be deployed for a 6-week exposure period beginning with the week of 8/24/09 and ending during the week of 10/5/09. This is latest period during the calendar year established by Ohio EPA for which the water temperatures in Ohio are high enough for valid macroinvertebrate testing. Passive sediment and water column samplers will be co-located with the H-D samplers, but only deployed for a 28-day exposure period. Surface sediment and water column sampling will also be conducted at the same locations. This set of biological pre-characterization tests are being conducted in Summer/early Fall 2009 because water temperatures will not have risen to acceptable levels by April 2010 when dredging is planned to commence to enable these studies to be conducted at that time.

A total of 18 sampling locations have been selected for carrying out this pre-characterization study, six each in Reaches 2, 3, and 4 (refer to Figure 1). In each reach, three of the sampling

stations will be located in zones intended to be dredged and three in zones where dredging is not planned. The target locations for these 18 sampling stations are described with latitude and longitude coordinates in Table 1. It is strongly emphasized that these are target locations. Actual sampling locations may vary as GLNPO finalizes its dredge plan prior to initiation of sampling. NERL researchers also desire that the local habitat (specifically water depth and water flow velocity) where the ECO H-Ds are to be deployed is similar to the range of habitats seen among Ohio EPA 2007 sampling locations (identified in Table 1). It is possible, therefore, that final sampling locations may not be set until the field team arrives on site and assays current site conditions. These target locations are provided to the Contractor for planning purposes only.

In implementing the Summer 2009 sampling and analysis program, the Contractor shall be responsible for conducting the following tasks.

Task 1. Development of Work Plan

The Contractor shall develop a synoptic Work Plan for carrying out this work assignment. Essentially most of the tasks involved in this study were conducted in similar fashion on the previously-mentioned Ashtabula River project, only at different sampling locations. This Work Plan can mimic many of the features of Ashtabula River Work Plans for WA No. 2-11 and TO No. 50 where appropriate. The Contractor shall prepare a draft Work Plan for U.S. EPA review within 4 working days of receiving the Work Assignment. U.S. EPA will review, request changes as needed, and approve within 1 working day.

Task 2. Development of QAPP

The Contractor shall develop a Quality Assurance project Plan (QAPP) for conducting the sampling and analytical tasks of this project. This QAPP can utilize verbatim analytical procedures specified for identical analyses in the Ashtabula River QAPP (QAID 163-Q14) prepared for WA No. 2-11 and TO No. 50. The Contractor shall develop new language for the Study Design portion of the QAPP. A new QAPP describing deployment of the ECO H-Ds has been developed by NERL and will be provided to the Contractor for attachment to the QAPP for this project. The Contractor shall prepare a draft QAPP for U.S. EPA review within 3 working days of receiving the Work Assignment. U.S. EPA will review, request changes as needed, and approve within 2 working days.

Task 3. Development of HASP

The Contractor shall prepare an Addendum to the Health and Safety Plan (HASP) prepared for WA No. 2-11 on the Ashtabula River project, addressing those features of this project that differ substantially from the previous project. The Contractor shall prepare a draft of this amended HASP for U.S. EPA review within 3 working days of receiving this Work Assignment. U.S. EPA will review, request changes as needed, and approve within 2 working days.

Task 4. Installation and Retrieval of Sampling Devices

The Contractor shall acquire necessary sampling devices and install same at the 18 target locations identified in Table 1. These devices shall be installed per the deployment arrangement shown in Figure 2. At all 18 stations, six in each of the three reaches, duplicate body burden H-D cage samplers shall be installed suspended in the water column on either side of the depicted passive samplers. NERL will provide all necessary body burden H-D cages. Between the two body burden H-D cages, a water SPMD cage shall also be suspended in the water column at each station as shown. A sediment SPMD rack shall be installed directly below and attached by cable to the water column SPMD at each station. The SPMD racks shall be installed in contact with the sediment surface. At six of the above sampling stations, an ECO H-D cinder block sampler shall also be installed along side the SPMD deployments as indicated and as prescribed in the NERL attachment to the QAPP. The ECO H-D cinder block samplers shall be laid on their sides on the sediment surface (with the H-Ds positioned on the upper sides of the cinder blocks). The bundle of sampling devices described above shall be installed as close to each as practical to minimize spatial variations in sample character and integrity. All H-D and SPMD devices shall be installed during the first 2 days (if feasible, otherwise 3 days will be acceptable) of the week of 8/24/2009. The deployment schedule shall be developed in concert with NERL researchers based on the rate at which they can harvest (or preserve the ECO H-Ds for later numeration and identification) the macroinvertebrate growth from the body burden H-Ds following retrieval. All SPMD samplers shall be retrieved during the week of 9/21/2009 on a schedule that provides for 28-day exposure of each device. The H-D samplers shall be retrieved during the week of 10/5/2009 on a schedule that provides for 42- day exposure of each sampler. At the time of H-D retrieval, NERL researchers will collect qualitative dip net samples in the vicinity of the six ECO H-D sample locations. These qualitative samples will be used in conjunction with data derived from the macroinvertebrates colonizing the ECO H-Ds to develop Ohio EPA macroinvertebrate metrics and Lacustrine Index of Biotic Integrity scores.

Upon retrieval, all SPMD devices shall be properly packaged and sent to EST for dialysis and extraction. The extracts will be returned to the Contractor for clean-up and analysis.

Upon retrieval, NERL will harvest all H-D assemblages on site. These H-D devices, submerged in water from the sampling locations, shall be supplied to on-site NERL/NRMRL researchers for harvesting the macrobenthos samples. Said NERL/NRMRL researchers will bottle the harvested macroinvertebrate samples in sample jars provided by the Contractor and then turn them over to the Contractor for transport to its laboratory and analysis.

Task 5. Collection of Sediment and Water Samples

The Contractor shall collect a composite surface sediment sample at each of the 18 sampling stations during the week (8/24/2009) of sampler deployment and again during the week (10/5/2009) of H-D retrieval. Each sample shall be formed by compositing the top 6 in. of 16 grab push cores taken around the perimeter of the sampler bundle and spaced approximately as shown in Figure 2. The individual cores shall be composited on site to yield a total of 18 composite sediment samples at sampler deployment and 18 composite sediment samples at sampler retrieval. The Contractor at its discretion shall homogenize the composite samples

either on site or in its laboratory prior to analysis. Standard sediment cores shall be employed that yield approximately 0.5 L of wet sediment sample in a 6-in. length. The 16 grab cores should, therefore, yield approximately 8 L of homogenized composite sample volume per station. Approximately 2 L of this volume shall be properly packaged and sent to NERL Cincinnati for sed-tox testing. Another 1-1.5 L, as needed shall be reserved by the Contractor for sediment chemistry analyses. The remainder shall be properly packaged and sent to NRMRL-Cincinnati for a battery of additional tests.

The Contractor shall collect water column samples in tandem with sediment sample collection at each of the 18 stations during the week of sampler deployment only. No water samples shall be taken during either week of sampler retrieval. These water samples shall be collected at approximate mid-depth of the water column. Sufficient sample shall be collected to conduct the battery of water chemistry analyses specified in Task 6. The samples shall be properly packaged and sent to the Contractor's laboratory for analysis.

Task 6. Conduct of Sediment and Water Analyses (Completion by 12/31/2009)

The Contractor shall conduct the following suite of analyses on each of the 36 sediment samples collected using methods approved in the QAPP (as taken from QAID 163-Q14):

- | | |
|-------------------------------------------|-------------------------------|
| 1. PCB Individual Congeners | 5. Total Organic Carbon |
| 2. PCB Homologs | 6. Moisture Content |
| 3. PCB Aroclors (10% of samples) | 7. Particle Size Distribution |
| 4. PAHs (16 priority plus alkylated PAHs) | |

The Contractor shall conduct the following suite of analyses on each of the 18 water column samples collected using methods approved in the QAPP (as taken from QAID 163-Q14):

- | | |
|-------------------------------------------|---------------------------|
| 1. PCB Individual Congeners | 5. Total organic Carbon |
| 2. PCB Homologs | 6. Total Suspended Solids |
| 3. PCB Aroclors (10% of samples) | 7. Turbidity |
| 4. PAHs (16 priority plus alkylated PAHs) | |

Task 7. Conduct of SPMD Analyses (Completion by 12/31/2009)

The Contractor shall conduct the following suite of analyses on each of the 36 SPMD extracts provided by EST using methods approved in the QAPP (as taken from QAID 163-Q14):

- | | |
|----------------------------------|-------------------------------------------|
| 1. PCB Individual Congeners | 4. PAHs (16 priority plus alkylated PAHs) |
| 2. PCB Homologs | 5. Performance Reference Compounds |
| 3. PCB Aroclors (10% of samples) | (if warranted by previous experience) |

Task 8. Conduct of Macroinvertebrate Analyses (Completion by 12/31/2009)

The Contractor shall conduct the following suite of analyses on each of the 36 macroinvertebrate samples harvested by NERL using methods approved in the QAPP (as taken from QAID 163-Q14):

- | | |
|----------------------------------|-------------------------------------------|
| 1. PCB Individual Congeners | 4. PAHs (16 priority plus alkylated PAHs) |
| 2. PCB Homologs | 5. Wet Weight |
| 3. PCB Aroclors (10% of samples) | 6. Lipids |

Task 9. Conduct of Fish Tissue Analyses (Completion by 12/31/2009)

Between the deployment and retrieval periods, NERL-Cincinnati intends to collect small, short-lived fish in each of Reaches 2, 3, and 4 in the Ottawa River. NERL will necropsy, homogenize, and freeze these fish either on site or at their laboratory at their discretion. NERL will send to the Contractor 18 fish tissue homogenate samples, six from each of the above three reaches, for analysis.

The Contractor shall conduct the following suite of analyses on each of the 18 fish tissue homogenates collected using methods approved in the QAPP (as taken from QAID 163-Q14):

- | | |
|----------------------------------|-------------------------------------------|
| 1. PCB Individual Congeners | 4. PAHs (16 priority plus alkylated PAHs) |
| 2. PCB Homologs | 5. Wet Weight |
| 3. PCB Aroclors (10% of samples) | 6. Lipids |

Task 10. Preparation of Monthly Progress Reports

Brief monthly progress reports shall be submitted to U.S. EPA by the 20th of the month following the first full month after the work assignment issuance. These reports shall summarize technical progress and any problems encountered, resolution of said problems, the latest data results, and cost expenditures.

Task 11. Preparation of Final Data Report

The Contractor shall prepare a final report summarizing all data generated in tabular and graphical formats as appropriate. The draft report shall be submitted to U.S. EPA by 1/31/2010. U.S. EPA will review the draft report, request changes as needed, and return the draft report for corrections to the Contractor by 2/7/2010. The Contractor shall submit the corrected final data report to U.S. EPA for review and approval by 2/15/2010.

CBI APPLICABILITY

CBI does not apply.

APPLICABLE CONTRACT TASKS

This work assignment titled **"Joint U.S. EPA GLNPO/ORD Project for Evaluation of Environmental Dredging for Remediating Contaminated Sediments in the Ottawa River, Pre-Dredging Characterization Phase"** relates to Task 1 (Collection and Analysis of Data) and Task 3 (Physical Testing) of the current SOW for this contract.

PERFORMANCE MEASURES

The Contractor's performance will be judged by: 1) timeliness in meeting the completion dates of the five analytical tasks and the final data report cited above, and 2) completeness in satisfactorily addressing and conducting all elements of this SOW as described in the Contractor's Work Plan and the QAPP.

The Government will review the Contractor's promptness in meeting the specified completion date (12/31/2009) for five analytical tasks and the specified completion date for the final data report (2/15/2010). If the Contractor is late by more than 7 days in meeting any of the analytical completion dates, a 5% reduction in fee will be applied by the Government. If the Contractor is late by more than 7 days in meeting the completion date for the final data report, a 5% reduction in fee will be applied by the Government. If the Contractor is late by more than 7 days in meeting any of the analytical completion dates plus the final data report completion date, a 10% reduction in fee will be applied by the Government. The reduction in fee will also increase to 10% if the Contractor is more than 14 days late in meeting any of the above completion dates. The reduction in fee will increase to 20% if the Contractor is more than 30 days late in meeting any of the above completion dates. Subject reductions in fee will not apply if it is determined that delayed completion is due to the Government for any reason. Said reductions also will not apply if delayed completion is due to unavoidable adverse weather conditions.

The Government will also review the Contractor's thoroughness in addressing and carrying out the technical requirements of their Work Plan and the quality assurance requirements of the QAPP. The Government acknowledges that assessment of thoroughness can be subjective and will consult with the Contractor prior to making any final determinations. After due deliberations, if the Government determines that the Contractor has not satisfactorily addressed one or more technical elements or quality assurance requirements, a 10% reduction in fee will be applied to each element and/or requirement. As above, subject reductions in fee will not apply if, for any reason, Government actions have resulted in non-acceptable performance.

If reductions in fee are deemed appropriate, they will apply to both paid and unpaid fees.

PERIOD OF PERFORMANCE

This work assignment will begin on the date U.S. EPA's Contracting Officer issues a Work Assignment to the Contractor and will extend through 2/15/2010.

LEVEL OF EFFORT

This Work Assignment is estimated to require 2,167 professional hours to complete.

U.S. EPA CONTACTS**I. Work Assignment Manager**

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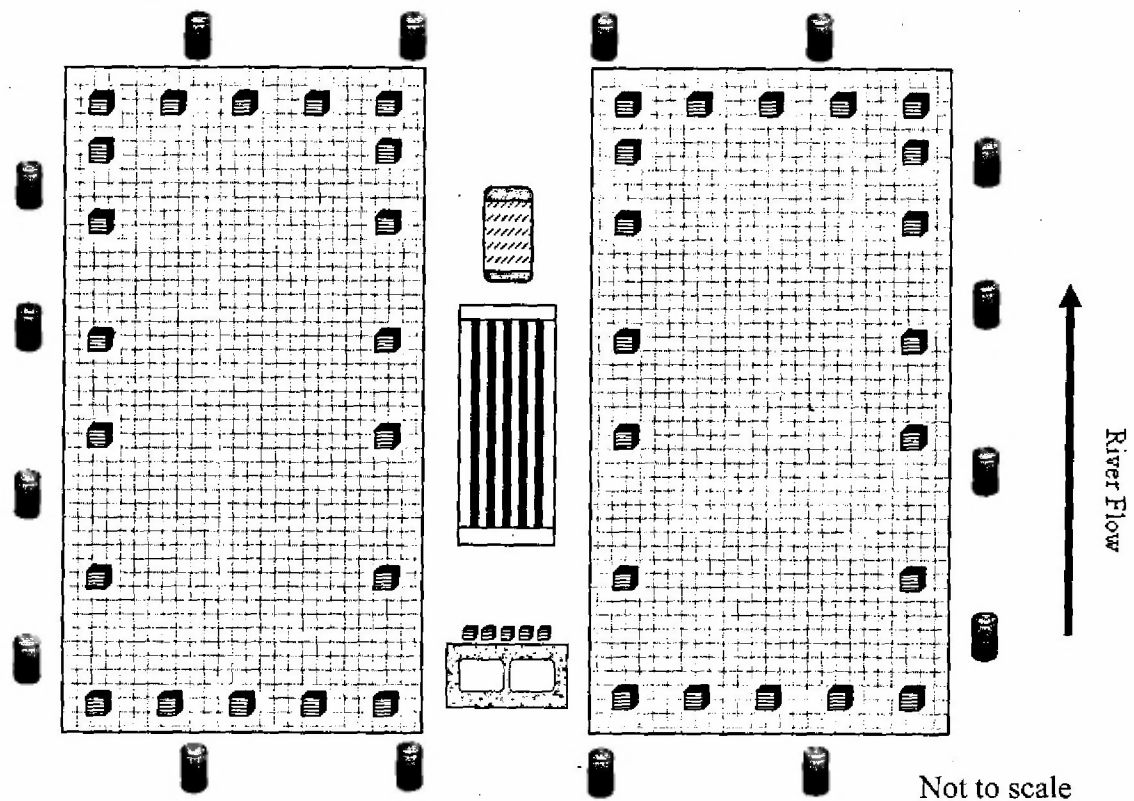
II. Co-Alternate Work Assignment Manager

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Figure 1. Ottawa River GLLA Project Overview Map Showing River Mile Delineations for the Four Reaches



KEY






-  = Body Burden Hester-Dendy deployment
-  = Ecological Hester-Dendy deployment
-  = Surface sediment core (0-6 in.)
-  = Sediment SPMD
-  = Water Column SPMD

Figure 2. Plan View Conceptual Layout of Hester-Dendy Devices, Passive Sampler Deployments, and Surface Sediment Sampling Locations

Table 1. Target Coordinate Locations for Hester-Dendy Deployments, Passive Sampler Deployments, and Surface Sediment Sampling

Reach	Dredge or Non-Dredge	Ohio EPA River Mile (RM) Designation/Date	Type of H-D Deployment	Latitude Coordinate	Longitude Coordinate
2	No	RM 3.5 (2000, 2007)	ECO+BB**	41.7111306	83.5048333
2	Yes, B*	RM 4.6 (2007)	ECO+BB	41.7023333	83.5198333
2	Yes, A	RM 4.9 (1986, 1992)	BB	41.7030979	83.5251882
2	No	RM 4.5	BB	41.7035827	83.5175179
2	Yes, D	RM 3.9	BB	41.7079263	83.5105703
2	No	RM 3.7	BB	41.7100643	83.508369
3	Yes, N	RM 5.5 (1996, 2002, 2007)	ECO+BB	41.6965556	83.5314444
3	No	RM 6.2 (2007)	ECO+BB	41.6901944	83.5393611
3	Yes, P	RM 5.3 (1996, 2002, 2007)	BB	41.6986944	83.5297778
3	No	RM 5.0 (2002, 2007)	BB	41.7030833	83.52825
3	Yes, L	RM 5.8 (1999, 2001, 2002, 2007)	BB	41.6940555	83.5350277
3	No	RM 6.1 (1999, 2000, 2001)	BB	41.6912311	83.5373787
4	No	RM 6.8 (2007)	ECO+BB	41.6878056	83.5503056
4	Yes, C	RM 7.4 (1986)	ECO+BB	41.6874365	83.563118
4	No	RM 8.0 (2007)	BB	41.6819639	83.5682611
4	Yes, D	RM 7.3 (2000)	BB	41.6877788	83.5616972
4	No	RM 8.6 (2007)	BB	41.6765	83.5741944
4	Yes, A	RM 8.4	BB	41.678475	83.5729971

* Letter designations refer to specific planned dredged zones within each reach.

**

United States Environmental Protection Agency
Washington, DC 20460

Assignment Number

Work Assignment

☐ Original ☒ Amendment Number: 6Contract Number
EP-W-09-024Contract Period
Base X

Option Period Number

Title of Work Assignment
"PCBs in Caulk Guidance Documents"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See the attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 08/20/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 12 April 2010, at a cost of \$85,324.00. Currently, there are 830 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$106,459.00	830
This Action	\$85,324.00	0
Total	\$191,783.00	830

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 04/12/10	Cost/Fee: \$85,324.00	LOE:
Cumulative Approved:	Cost/Fee: \$191,783.00	LOE: 830

Work Assignment Manager Name

Branch/Mail Code 7404T

ROBERT T. COURTNAGE

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(Signature)

(Date)

Fax Number (202) 566-0473

Project Officer Name

Branch/Mail Code 7404T

SINETA WOOTEN

Phone Number (202) 566-0501

(Signature)

(Date)

Fax Number (202) 566-0469

Other Agency Official Name

Branch/Mail Code

Phone Number

(Signature)

(Date)

Fax Number

Contracting Official Name

Branch/Mail Code 3803R

CHRISTINE EDWARDS

Phone Number (202) 564-2182

(Signature)

(Date)

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12, Amendment: 0006

Summary Information

Title: "PCBs in Caulk Guidance Documents"
Period of Performance: From: 08/20/09
To: 06/22/10
Award Date: 08/20/09
Total Funding:

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
-----	-----	(b)(4)		
Estimated Cost	Base Pd.	\$		
Fixed Fee	Base Pd.			



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number

0-

☐ Original ☒ Amendment Number: 5

Contract Number
EP-W-09-024

Contract Period
Base X

Option Period Number

Title of Work Assignment
"PCBs in Caulk Guidance Documents"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See the attached Statement of Work

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/20/09

To: 06/22/10

Comments:

This amendment rejects the Work Plan dated March 1, 2010. Based on discussions between the EPA and Battelle on March 4, 2010, a revised Financial Work Plan is required.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$106,459.00	830
This Action	\$0.00	0
Total	\$106,459.00	830

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee: \$106,459.00	LOE: 830

Work Assignment Manager Name

Branch/Mail Code 7404T

ROBERT T. COURTNAGE

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(Signature)

(Date)

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Project Officer Name

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SINETA WOOTEN

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(Date)

Fax Number (202) 566-0469

Other Agency Official Name

Branch/Mail Code

Phone Number

(Signature)

(Date)

Fax Number

Contracting Official Name

Branch/Mail Code 3803R

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Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12, Amendment: 0005

Summary Information

Title: "PCBs in Caulk Guidance Documents"
Period of Performance: From: 08/20/09
To: 06/22/10
Award Date: 08/20/09
Total Funding:

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-

Work Assignment

☐ Original ☒ Amendment Number: 4Contract Number
EP-W-09-024Contract Period
Base X

Option Period Number

Title of Work Assignment
"PCBs in Caulk Guidance Documents"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See the attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/20/09

To: 06/22/10

Comments:

This amendment revises and updates the guidance document for this Work Assignment. A revised Financial Work Plan is required.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$106,459.00	830
This Action	\$0.00	0
Total	\$106,459.00	830

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee: \$106,459.00	LOE: 830

Work Assignment Manager Name

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(Date)

Project Officer Name

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(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

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(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12, Amendment: 0004

Summary Information

Title: "PCBs in Caulk Guidance Documents"
Period of Performance: From: 08/20/09
To: 06/22/10
Award Date: 08/20/09
Total Funding:

Procurement Management Roles

The following item(s) have been modified:

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Date Role Ended: 02/16/10

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E-Mail Address: edwards.christine@epa.gov

Attachments

The following item(s) have been added:

Attachment Name

Revised SOW for Amd. 4

Contract Number: EP-W-09-024**Work Assignment Amendment:** WA 0-12/Amd. 4**Title: PCBs in Caulk Guidance Documents and Update of Asbestos Guidance Documents**

Purpose: This work assignment currently provides support for developing multiple guidance documents regarding polychlorinated biphenyls (PCBs)-containing caulking material. The contractor will develop these various guidance documents upon request and through technical direction from the (work assignment manager) WAM.

The work assignment is being amended to support the Agency's effort to provide the most current guidance on the removal and maintenance of asbestos containing materials in buildings. This effort will include updating existing guidance documents at the direction of the WAM.

I. Background

EPA is issuing guidance to the public so they may take steps to minimize exposure to PCBs in caulk. PCBs are highly toxic chemicals that bioaccumulate and persist in the environment, and have been detected in caulk found in some older schools and buildings at high levels. PCBs migrate from the caulk into the air, dust, or surrounding building materials, and can pose serious health risks to people from cumulative, long term exposure. Since contaminated caulk will off gas PCBs for decades, EPA is recommending schools and other building owners determine if PCBs are present in the caulk and if detected, take steps to help minimize exposures until the caulk can be removed.

Airborne asbestos contamination in buildings is a significant environmental problem. Various diseases have been linked with industrial exposure to airborne asbestos, and the extensive use of asbestos products in buildings has raised concerns about exposure to asbestos in nonindustrial settings. Surveys conducted by the Environmental Protection Agency (EPA) estimate that asbestos-containing materials can be found in thousands schools and public and commercial buildings in this country. The presence of asbestos in a building does not mean that the health of building occupants is necessarily endangered. As long as asbestos-containing material (ACM) remains in good condition and is not disturbed, exposure is unlikely. When building maintenance, repair, renovation or other activities disturb ACM, or if it is damaged, asbestos fibers are released creating a potential hazard to building occupants. In 1985, EPA prepared and distributed "Guidance for Controlling Asbestos-Containing Materials in Buildings" (a.k.a., the "Purple Book"). Since this guidance was published, EPA has gathered additional information and has gained valuable experience through its continuing Asbestos-in-Buildings Program.

II. Scope of Work

Task 1: No change

Task 2: The contractor will revise and update the document Guidance for Controlling Asbestos-Containing Materials in Buildings to reflect current government guidance, regulations and standards. The WAM will

Revised SOW for Am 4

Contract: EP-W-09-024, Work Assignment: 0-12, Amendment: 0004

provide updated materials and comments received from outside sources to facilitate the update.

III. Deliverables

Task 1: No change

Task 2: The contractor will deliver a completed revision to the document Guidance for Controlling Asbestos-Containing Materials in Buildings within one calendar week of receiving final comments from EPA.

A work plan is not required.

A QA/QC plan is not required.

CBI does not apply.

This work assignment relates to Tasks III and IV Program Support of the current Statement of Work (SOW) of the contract.

IV. Period of Performance

This work assignment will start on the date of the contracting officer's signature and extend through June 22, 2010.

V. Level of Effort

No change.

VI. EPA Contacts

No change

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number

0-

☐ Original ☒ Amendment Number: 3

Title of Work Assignment

"PCBs in Caulk Guidance Documents"

Contract Number

EP-W-09-024

Contract Period

Base X

Option Period Number

Contractor

BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW

See the attached Statement of Work

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out☒ Work Assignment Amendment ☐ Incremental Funding☒ Work Plan Approval

Periods of Performance

From: 08/20/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 20 November 2009, at a cost of \$70,574.00. Currently, there are 830 labor hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:

Cost/Fee

LOE

Previously Approved

\$35,885.00

830

This Action

\$70,574.00

0

Total

\$106,459.00

830

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 12/30/09

Cost/Fee: \$70,574.00

LOE:

Cumulative Approved: 12/31/09

Cost/Fee: \$106,459.00

LOE: 830

Work Assignment Manager Name

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Project Officer Name

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Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12, Amendment: 0003

Summary Information

Title: "PCBs in Caulk Guidance Documents"
Period of Performance: From: 08/20/09
To: 06/22/10
Award Date: 08/20/09
Total Funding:

Procurement Management Roles

The following item(s) have been modified:

ADMINISTRATIVE CONTRACTING OFFICER:

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Phone Number: (202) 564-9706
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E-Mail Address: bushta.dennisjames@epa.gov

ADMINISTRATIVE CONTRACTING OFFICER:

U.S. E.P.A.
Attn: CHRISTINE EDWARDS
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Date Role Ended: 12/30/09

Mail Code: 3803R
Phone Number: (202) 564-2182
Fax Number:
E-Mail Address: edwards.christine@epa.gov

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.	\$	(b)(4)	
Fixed Fee	Base Pd.			

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

2

Work Assignment

☐ Original ☒ Amendment Number: 2Contract Number
EP-W-09-024Contract Period
Base X

Option Period Number

Title of Work Assignment
"PCBs in Caulk Guidance Documents"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See the attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 08/20/09

To: 06/22/10

Comments:

The purpose of this amendment is to increase the LOE by 560 Professional Hours, revising the total amount to 830 Professional Labor Hours. The increase is required due to the amount of comments and revisions for the PCB Guidance Documents. A revised Financial Work Plan is required.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$35,885.00	270
This Action	\$0.00	560
Total	\$35,885.00	830

Work Plan / Cost Estimate Approvals

Contractor WP Dated:	Cost/Fee:	LOE: 560
Cumulative Approved:	Cost/Fee: \$35,885.00	LOE: 830

Work Assignment Manager Name

ROBERT T. COURTNAGE

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-1081

Fax Number (202) 566-0473

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12, Amendment: 0002

Summary Information

Title: "PCBs in Caulk Guidance Documents"
Period of Performance: From: 08/20/09
To: 06/22/10
Award Date: 08/20/09
Total Funding:

Procurement Management Roles

The following item(s) have been modified:

ADMINISTRATIVE CONTRACTING OFFICER:

U.S. E.P.A.
Attn: DENNIS J. BUSHTA
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Date Role Ended: 11/03/09

Mail Code: 3803R
Phone Number: (202) 564-9706
Fax Number: (202) 565-2560
E-Mail Address: bushta.dennisjames@epa.gov

ADMINISTRATIVE CONTRACTING OFFICER:

U.S. E.P.A.
Attn: CHRISTINE EDWARDS
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Mail Code: 3803R
Phone Number: (202) 564-2182
Fax Number:
E-Mail Address: edwards.christine@epa.gov

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 270 to 830.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number
0-12

☐ Original ☒ Amendment Number: 1

Contract Number
EP-W-09-024

Contract Period
Base X

Option Period Number

Title of Work Assignment
"PCBs in Caulk Guidance Documents"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See the attached Statement of Work

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 08/20/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 04 September 2009, at a cost of \$35,885.00. Currently, there are 270 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 8)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period: Cost/Fee LOE
Previously Approved \$0.00 270

This Action \$35,885.00 0

Total \$35,885.00 270

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 09/04/09 Cost/Fee: \$35,885.00 LOE:

Cumulative Approved: 10/02/09 Cost/Fee: \$35,885.00 LOE: 270

Work Assignment Manager Name

ROBERT T. COURTNAGE

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-1081

Fax Number (202) 566-0473

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

DENNIS J. BUSHTA

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-9706

Fax Number (202) 565-2560

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12, Amendment: 0001

Summary Information

Title: "PCBs in Caulk Guidance Documents"
Period of Performance: From: 08/20/09
To: 06/22/10
Award Date: 08/20/09
Total Funding:

Procurement Management Roles

The following item(s) have been modified:

ADMINISTRATIVE CONTRACTING OFFICER:

U.S. E.P.A.
Attn: CHRISTINE EDWARDS
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Date Role Ended: 10/01/09

Mail Code: 3803R
Phone Number: (202) 564-2182
Fax Number:
E-Mail Address: edwards.christine@epa.gov

The following item(s) have been added:

ADMINISTRATIVE CONTRACTING OFFICER:

U.S. E.P.A.
Attn: DENNIS J. BUSHTA
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Mail Code: 3803R
Phone Number: (202) 564-9706
Fax Number: (202) 565-2560
E-Mail Address: bushta.dennisjames@epa.gov

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.	\$0.00	(b)(4)	
Fixed Fee	Base Pd.	\$0.00		



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-12

Work Assignment

☒ Original ☐ Amendment Number:

Contract Number
EP-W-09-024

Contract Period
Base **X**

Option Period Number

Title of Work Assignment
"PCBs in Caulk Guidance Documents"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See the attached Statement of Work

Purpose: ☒ Work Assignment Initiation ☐ Work Assignment Close-Out
☐ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: **08/20/09**

To: **06/22/10**

Comments:

Work Assignment Initiation

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period: Cost/Fee LOE
Previously Approved

This Action

Total \$0.00 270

Work Plan / Cost Estimate Approvals

Contractor WP Dated : Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: \$0.00 LOE: 270

Work Assignment Manager Name

ROBERT T. COURTNAGE

Branch/Mail Code **7404T**

Phone Number **(202) 566-1081**

Fax Number **(202) 566-0473**

(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

Branch/Mail Code **7404T**

Phone Number **(202) 566-0501**

Fax Number **(202) 566-0469**

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

Contracting Official Name

CHRISTINE EDWARDS

Branch/Mail Code **3803R**

Phone Number **(202) 564-2182**

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12

Summary Information

Title: "PCBs in Caulk Guidance Documents"
Period of Performance: From: 08/20/09
To: 06/22/10
Award Date:
Total Funding:

Procurement Management Roles

WORK ASSIGNMENT MANAGER:

U.S. E.P.A.
Attn: ROBERT T. COURTNAGE
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Mail Code: 7404T
Phone Number: (202) 566-1081
Fax Number: (202) 566-0473
E-Mail Address: courtnage.robert@epa.gov

ALTERNATE WORK ASSIGNMENT MANAGER:

U.S. E.P.A.
Attn: THOMAS G. SIMONS
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Mail Code: 7404t
Phone Number: (202) 566-0517
Fax Number: (202) 566-0473
E-Mail Address: simons.thomas@epa.gov

Attachments

Attachment Name

"PCBs in Caulk Guidance Documents"

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12

Contract Number: EP-W-09-024

Work Assignment: WA 0-12

Title: "PCBs in Caulk Guidance Documents"

Purpose: This work assignment will provide support for developing multiple guidance documents regarding polychlorinated biphenyls (PCBs)-containing caulking material. The contractor will develop these various guidance documents upon request and through technical direction from the (work assignment manager) WAM.

I. Background:

EPA is issuing guidance to the public so they may take steps to minimize exposure to PCBs in caulk. PCBs are highly toxic chemicals that bioaccumulate and persist in the environment, and have been detected in caulk found in some older schools and buildings at high levels. PCBs migrate from the caulk into the air, dust, or surrounding building materials, and can pose serious health risks to people from cumulative, long term exposure. Since contaminated caulk will off gas PCBs for decades, EPA is recommending schools and other building owners determine if PCBs are present in the caulk and if detected, take steps to help minimize exposures until the caulk can be removed.

II. Scope of Work:

Task 1: Develop various PCBs in caulk guidance materials

Develop materials including: a document with general information, documents for teachers and parents, documents regarding safe renovation practices with PCBs in caulk and other factsheets and/or guidance documents as needed.

III. Deliverables:

Task 1: As per technical direction from the WAM, produce various PCBs in caulk guidance documents and factsheets in an expedited timeframe as the contractor is able to complete them and as discussed and agreed upon with the WAM. The contractor will not exceed 14 calendar days in completing any draft deliverable.

A work plan is not required.

A QA/QC plan is not required.

CBI does not apply.

This work assignment relates to Tasks III and IV Program Support of the current Statement of Work (SOW) of the contract.

IV. Period of Performance:

This work assignment will start on the date of the contracting officer's signature and extend through June 22, 2010.

"PCBs in Caulk Guidance Documents"

Contract: EP-W-09-024, Work Assignment: 0-12

V. Level of Effort:

This work assignment shall require 270 professional hours.

VI. EPA Contacts:

Work Assignment Manager:

Robert Courtnage

Fibers and Organics Branch

National Program Chemicals Division (7404T)

US EPA

Voice: 202-566-1081

Fax: 202-566-0473

Email: courtnage.robert@epa.gov

Mailing Address:

1200 Pennsylvania Ave. NW

Washington, DC 20460

Delivery Address:

Room 4353, EPA East

1201 Constitution Ave. NW

Washington, DC 20004

Deputy Work Assignment Manager:

Thomas Simons

Fibers and Organics Branch

National Program Chemicals Division (7404T)

US EPA

Voice: 202-566-0517

Fax: 202-566-0473

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number

0-

☐ Original ☒ Amendment Number: 2Contract Number
EP-W-09-024

Contract Period

Base X

Option Period Number

Title of Work Assignment

"The Enforcement Response and Penalty
Policy for the LBP RRP Rule"

Contractor

BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW

See attached Statement of Work

Purpose:

☐ Work Assignment Initiation☐ Work Assignment Close-Out☒ Work Assignment Amendment☐ Incremental Funding☒ Work Plan Approval

Periods of Performance

From: 10/01/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 18 December 2009, at a cost of \$25,608.00. Currently, there are 206.5 Professional Labor Hours approved for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:

Cost/Fee

LOE

Previously Approved

\$0.00

300

This Action

\$25,608.00

(94)

Total

\$25,608.00

207

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 01/21/10

Cost/Fee: \$25,608.00

LOE: 94

Cumulative Approved: 01/21/10

Cost/Fee: \$25,608.00

LOE: 207

Work Assignment Manager Name

YVETTE P. HELLYER

Branch/Mail Code 2249A

Phone Number (202) 564-4033

Fax Number (202) 564-0020

(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

Contracting Official Name

CHRISTINE EDWARDS

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"The Enforcement Response and Penalty Policy for the LBP RRP Rule"

Contract: EP-W-09-024, Work Assignment: 0-13, Amendment: 0002

Summary Information

Title: "The Enforcement Response and Penalty Policy for the LBP RRP Rule"
Period of Performance: From: 10/01/09 To: 06/22/10
Award Date: 09/30/09
Total Funding:

WA Totals

The following item(s) have been added:

Category	POP	Amount
Estimated Cost	Base Pd.	\$ (b)(4)
Fixed Fee	Base Pd.	

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 300 to 206.5.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Assignment Number

☐ Original ☒ Amendment Number: 1

Contract Number
EP-W-09-024

Contract Period
Base ☒ Option Period Number

Title of Work Assignment
"The Enforcement Response and Penalty
Policy for the LBP RRP Rule"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See attached Statement of Work

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance
From: 10/01/09 To: 06/22/10

Comments:
The Work Plan dated 16 October 2009, has been rejected. A revised Statement of Work is attached. A revised Technical and Financial Work Plan is required.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$0.00	300
This Action	\$0.00	0
Total	\$0.00	300

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee: \$0.00	LOE: 300

Work Assignment Manager Name

YVETTE P. HELLYER

(Signature)

(Date)

Branch/Mail Code 2249A

Phone Number (202) 564-4033

Fax Number (202) 564-0020

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"The Enforcement Response and Penalty Policy for the LBP RRP Rule"

Contract: EP-W-09-024, Work Assignment: 0-13, Amendment: 0001

Summary Information

Title: "The Enforcement Response and Penalty Policy for
the LBP RRP Rule"
Period of Performance: From: 10/01/09
To: 06/22/10
Award Date: 09/30/09
Total Funding:

Attachments

The following item(s) have been added:

Attachment Name

Modification #1 to SOW

Modification #1 to SO

Contract: EP-W-09-024, Work Assignment: 0-13, Amendment: 01

Contract Number: EP-W-09-024

Work Assignment: 0-13

Modification 1; 12/02/09

Title: The Consolidated Enforcement Response and Penalty Policy for the Lead-Based Paint Abatement, Pre-Renovation Education and Renovation, Repair and Painting Rules.

Purpose:

This work assignment will provide support for drafting a consolidated Enforcement Response and Penalty Policy (ERPP) for the Abatement, Pre-renovation Education, and Renovation, Repair and Painting Rules (40 CFR Part 745 Subparts E and L)

I. Background:

The Waste and Chemical Enforcement Division of EPA's Office of Civil Enforcement is developing a new consolidated ERPP for the lead-based paint Abatement, Pre-renovation Education, and Renovation, Repair and Painting Rules. This ERPP will set forth guidelines for EPA to use in determining the appropriate enforcement response and penalty amounts, in settlement or in litigation, for violations of the Abatement, Pre-renovation Education, and Renovation, Repair and Painting Rules. The policy will take into account any amendments to the original R, R & P Rule, the increase in the maximum statutory penalty required by the Debt Collection Improvement Act (DCIA) of 1996, recent case law developments and other relevant EPA policies that impact enforcement actions.

The purpose of this Policy is to provide predictable and consistent enforcement responses and penalty amounts for violations of the Abatement, Pre-renovation Education, Renovation, Repair and Painting Rules program requirements, yet retain flexibility to allow for individual facts and circumstances of a particular case. The policies and procedures in the ERPP are intended solely for the guidance of employees of the EPA. This policy is not a rulemaking and is not binding on the Agency.

Summary of the work assignment

The contractor will develop an initial draft of the ERPP (Task 1) based on the draft ERPPs already provided and the regulatory requirements of the Abatement, Pre-renovation Education, and Renovation, Repair and Painting Rules. Subsequently, the contractor will develop a second draft based on comments received from workgroup members (and others) as directed by the contracting officer representative (COR)(Task 2). The drafts will follow the format of the draft ERPP for the lead-based paint Pre-Renovation Education (PRE) Rule. All documents will be drafted in Microsoft Word 2003.

II. Scope of Work:

Modification #1 to SOW

Contract: EP-W-09-024, Work Assignment: 0-13, Amendment: 0001

Task 1: Modify and update the draft lead-based paint PRE-Rule ERPP

Using the modified draft ERPP for the PRE-Rule (already provided), the contractor will create an initial draft of the new document by modifying Chapter 1 **Introduction** to reflect its broader application to the Abatement and Renovation, Repair and Painting Rules and incorporate regulatory requirements of the Abatement, and Renovation, Repair and Painting Rules where appropriate, modifying (i.e., by dividing into 3 chapters) Chapter 2 **Summary of Rule and Requirements** to reflect the additional requirements of the Abatement, and Renovation, Repair and Painting Rules, (including explanations in the rule's preamble) as appropriate, modifying Chapter 3 **Responsible Party/Appropriate Respondent** to reflect its broader application to the Abatement, and Renovation, Repair and Painting Rules, modifying Chapter 4 **Determining Level of Action** to incorporate regulatory requirements of the Abatement, and Renovation, Repair and Painting Rules where appropriate, modifying Chapters 5 and 6 to reflect the broader application to the Abatement, and Renovation, Repair and Painting Rules, as appropriate, and modifying Chapter 7 **Adjustment Factors** to reflect its broader application to the Abatement, and Renovation, Repair and Painting Rules.

The contractor will develop a modified and expanded Appendix A incorporating the Abatement, and Renovation, Repair and Painting Rules regulatory requirements. This list will be provided to the COR by December 7, 2009. The workgroup will provide comments, additions or modifications to the expanded Appendix A and tentatively assign Circumstance Levels to the various regulatory requirements. The contractor, in consultation with the COR and Project Technical Consultant, will address the comments. Unresolved conflicts or outstanding questions will be noted and provided, in writing, to the COR.

The contractor will develop two additional chapters summarizing the requirements for the Abatement Rule and the requirements for the Renovation, Repair and Painting Rule using the existing format in Chapter 2 of the draft §406(b) ERPP as a model. It is suggested that the regulatory summary in Chapter 1 of the "Section 402 (Abatement Rule) Draft EPR" be used as the starting point for the summary of the Abatement Rule, where appropriate. The contractor shall provide the three chapters to the COR December 30, 2009.

The contractor will incorporate the modified Appendix A and new chapters on the regulatory requirements for the Abatement Rule and the Renovation, Repair and paint Rule into the existing draft existing draft ERPP, make other changes as appropriate for context and readability and provide a 1st draft of the complete ERPP document to the COR by January 18, 2010, for presentation to the ERPP workgroup.

Task 2: Participating in workgroup meetings, summarizing and incorporating comments and updating drafts.

Modification #1 to SOW

Contract: EP-W-09-024, W Assignment: 0-13, Amendment: 1

The workgroup will provide comments, additions or modifications to the 1st draft of the ERPP document. The contractor, in consultation with the COR and Technical Consultant, will address the comments and provide the COR. Unresolved conflicts or outstanding questions will be noted and provided, in writing, to the COR.

The contractor shall participate in one teleconference with the workgroup to review and discuss the draft and summarize any verbal comments. The contractor, in consultation with the COR and Technical Consultant, will address any outstanding comments. Unresolved conflicts or outstanding questions will be noted and provided, in writing along with the 2nd draft of the ERPP, to the COR..

III. Deliverables:

Task 1: At the direction of the COR, the contractor shall deliver electronically, the initial redraft of Appendix A and the list of new regulations for inclusion in Appendix A, to the workgroup COR by November 4, 2009. The contractor shall deliver the completed 1st draft of the ERPP within 5 workdays of the consultation with the COR in Task 2.. Extensions of time for deliverables, due to the complexity of the comments or changes or for other reasons are at the sole discretion of the COR.

Task 2: At the direction of the COR, the contractor shall distribute summaries of comments and redrafts of the ERPP to the COR or directly to the workgroup members. Documents shall be ready for distribution within 5 workdays of the previous conference call or subsequent consultation with the COR, which ever is later. Extensions of time for deliverables, due to the complexity of the comments or changes or for other reasons are at the sole discretion of the COR.

A draft and final work plan is required

A QA/QC plan is not required.

No printing is required

CBI does not apply. The contractor recognizes that all materials relating to the development of the draft ERPP, including all drafts, comments, summaries of comments and notes taken during teleconferences are enforcement confidential and shall not be discussed or distributed except at the direction of the contracting officer representative.

This work assignment relates to Tasks III and IV Program Support of the current Statement of Work (SOW) of the contract.

IV. Period of Performance:

This work assignment will start on the date of the contracting officer's signature and extend through June 22, 2010.

V. Level of Effort:

Modification #1 to SOW

Contract: EP-W-09-024, Work Assignment: 0-13, Amendment: 0001

This work assignment shall require no more than **220** professional hours.

VI. EPA Contacts:

Contracting Officer Representative:

Yvette Hellyer

Waste and Chemical Enforcement Division (2249A)

Voice: 202-564-4033

Fax: 202-564-0020

Email: hellyer.yvette@epa.gov

Mailing Address:

1200 Pennsylvania Ave. NW

Washington, DC 20460

Delivery Address:

Room 5039C, Ariel Rios

1200 Pennsylvania Ave. NW

Washington, DC 20004

Deputy Work Assignment Manager:

Beth Burchard

Waste and Chemical Enforcement Division (2249A)

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Fax: 202-564-0035

Email: burchard.beth@epa.gov

Project Technical Consultant

Tony Baney

Waste and Chemical Enforcement Division (2249A)

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United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-13

Work Assignment

☒ Original ☐ Amendment Number:

Contract Number
EP-W-09-024

Contract Period
Base ☒ Option Period Number

Title of Work Assignment
"The Enforcement Response and Penalty
Policy for the LBP RRP Rule"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See attached Statement of Work

Purpose: ☒ Work Assignment Initiation ☐ Work Assignment Close-Out
☐ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 10/01/09

To: 06/22/10

Comments:

Work Assignment Initiation

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period: Cost/Fee LOE
Previously Approved

This Action

Total \$0.00 300

Work Plan / Cost Estimate Approvals

Contractor WP Dated : Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: \$0.00 LOE: 300

Work Assignment Manager Name

Branch/Mail Code 2249A

Phone Number (202) 564-4033

Fax Number (202) 564-0020

(Signature)

(Date)

Project Officer Name

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

Contracting Official Name

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"The Enforcement Response and Penalty Policy for the LBP RRP Rule"

Contract: EP-W-09-024, Work Assignment: 0-13

Summary Information

Title: "The Enforcement Response and Penalty Policy for the LBP RRP Rule"
Period of Performance: From: 10/01/09
To: 06/22/10
Award Date:
Total Funding:

Procurement Management Roles

WORK ASSIGNMENT MANAGER:

U.S. E.P.A.
Attn: YVETTE P. HELLYER
1200 PENNSYLVANIA AVE, NW
WASHINGTON, DC 20460

Mail Code: 2249A
Phone Number: (202) 564-4033
Fax Number: (202) 564-0020
E-Mail Address: hellyer.yvette@epa.gov

Attachments

Attachment Name

SOW entitled, "The Enforcement Response and Penalty for the LBP RRP Rule"

Contract Number: EP-W-09-024

Work Assignment: 0-13

Title: "The Enforcement Response and Penalty Policy for the Lead-Based Paint Renovation, Repair and Painting Rule"

Purpose:

This work assignment will provide support for drafting an Enforcement Response and Penalty Policy (ERPP) for the Renovation, Repair and Painting (R, R & P) Rule (40 CFR Part 745. 73 Federal Register 21692 – 21769; 4/22/08; as amended).

I. Background:

The Waste and Chemical Enforcement Division in EPA's Office of Civil Enforcement is developing a new ERPP for the lead-based paint R, R & P Rule. This ERPP will set forth guidelines for EPA to use in determining the appropriate enforcement response and penalty amount, in settlement or in litigation, for violations of the R, R & P Rule. The policy will take into account any amendments to the original R, R & P Rule, the increase in the maximum statutory penalty required by the Debt Collection Improvement Act (DCIA) of 1996, recent case law developments and other relevant EPA policies that impact enforcement actions.

The purpose of this Policy is to provide predictable and consistent enforcement responses and penalty amounts for violations of the R, R & P Rule program requirements, yet retain flexibility to allow for individual facts and circumstances of a particular case. The policies and procedures in the ERPP are intended solely for the guidance of employees of the EPA. This policy is not a rulemaking and is not binding on the Agency.

The contractor will develop drafts based on the regulatory requirements of the R, R & P Rule program and on comments received from workgroup members (and others) as directed by the contracting officer representative (COR). The drafts will follow the format of the draft ERPP for the lead-based paint Pre-Renovation Education (PRE) Rule, which will be provided by the COR.

II. Scope of Work:

Task 1: Modify and update the draft PRE-Rule ERPP

Using the draft ERPP for the PRE-Rule, the contractor will create an initial draft of the document by modifying Chapter 1 **Introduction** to reflect its broader application to the R, R & P Rule and incorporate regulatory requirements of the R, R & P Rule where appropriate, modifying Chapter 2 **Summary of Rule and Requirements** to reflect the additional requirements of the R, R & P Rule, (including explanations in the rule's preamble) as appropriate, modifying Chapter 3 **Responsible Party/Appropriate Respondent** to reflect its broader application to the R, R & P Rule, modifying Chapter 4 **Determining Level of Action** to incorporate regulatory requirements of the R, R & P Rule where appropriate, modifying Chapters 5 and 6 to reflect its broader application to the R, R & P Rule, as appropriate, and modifying Chapter 7 **Adjustment Factors** to

SOW entitled, "The Enforcement Response and Penalty for the LBP RRP Rule"

Contract: EP-W-09-024, Work Assignment: 0-13

reflect its broader application to the R, R & P Rule.

The contractor will develop a separate list of R, R & P Rule regulatory requirements for modifying and expanding Appendix A. This list will be provided to the COR. The contractor will participate in a teleconference, arranged by the COR, with the ERPP workgroup. The workgroup will provide any modifications to the list and tentatively assign Circumstance Levels to the various regulatory requirements so that the contractor can expand and incorporate the requirements into Appendix A for inclusion in the initial draft of the ERPP.

Task 2: Participating in workgroup meetings, summarizing and incorporating comments and updating drafts.

The contractor shall participate in multiple (approximately 5 of no more than 2 hours in length) teleconferences with the workgroup to review and discuss successive drafts of the ERPP, summarize any verbal and written comments, incorporate comments as directed by the COR, and distribute electronically, summaries of comments, updated drafts of the ERPP or other materials.

III. Deliverables:

Task 1: At the direction of the COR, the contractor shall deliver electronically, the initial redraft of Appendix A and the list of new regulations for inclusion in Appendix A, to the workgroup members within 4 weeks of initiation of work under this work assignment. The contractor shall deliver the completed initial draft of the ERPP within 5 workdays of the teleconference. Extensions of time for deliverables, due to the complexity of the comments or changes or for other reasons are at the sole discretion of the COR.

Task 2: At the direction of the COR, the contractor shall distribute summaries of comments and redrafts of the ERPP to the COR or directly to the workgroup members. Documents shall be ready for distribution within 5 workdays of the previous conference call. The COR shall authorize distribution of materials. Extensions of time for deliverables, due to the complexity of the comments or changes or for other reasons are at the sole discretion of the COR.

A work plan is not required.

A QA/QC plan is not required.

No printing is required

CBI does not apply. The contractor recognizes that all materials relating to the development of the draft ERPP, including all drafts, comments, summaries of comments and notes taken during teleconferences are enforcement confidential and shall not be discussed or distributed except at the direction of the contracting officer representative.

This work assignment relates to Tasks III and IV Program Support of the current Statement of Work (SOW) of the contract.

SOW entitled, "The Enforcement Response and Penalty for the LBP RRP Rule"

Contract: EP-W-09-024, Work Assignment: 0-13

IV. Period of Performance:

This work assignment will start on the date of the contracting officer's signature and extend through June 22, 2010.

V. Level of Effort:

This work assignment shall require 300 professional hours.

VI. EPA Contacts:

Contracting Officer Representative:

Yvette Hellyer

Waste and Chemical Enforcement Division (2249A)

Voice: 202-564-4033

Fax: 202-564-0020

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Mailing Address:

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Delivery Address:

Room 5039C, Ariel Rios

1200 Pennsylvania Ave. NW

Washington, DC 20004



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

14

Work Assignment

☐ Original ☒ Amendment Number: 4

Contract Number
EP-W-09-024

Contract Period

Base X

Option Period Number

Title of Work Assignment

"Measurement and Evaluation Plan for the
E3 (Economy, Energy, and the Environment)
Initiative"

Contractor

BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW

See the attached Statement of Work

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out

☒ Work Assignment Amendment ☐ Incremental Funding

☐ Work Plan Approval

Periods of Performance

From: 11/18/09

To: 06/22/10

Comments:

The purpose of this amendment is to issue a Stop Work order which caps this Work
Assignment at \$85,000.00.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 6)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$197,536.00	572
This Action	(\$112,536.00)	0
Total	\$85,000.00	572

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee: \$85,000.00	LOE: 572

Work Assignment Manager Name

REBECCA S. COOL

(Signature)

(Date)

Branch/Mail Code 7409M

Phone Number (202) 564-9138

Fax Number (202) 564-8901

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment) Initiative"

Contract: EP-W-09-024, Work Assignment: 0-14, Amendment: 0004

Summary Information

Title: "Measurement and Evaluation Plan for the E3
(Economy, Energy, and the Environment) Initiative"
Period of Performance: From: 11/18/09
To: 06/22/10
Award Date: 11/18/09
Total Funding:

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.	\$ (b)(4)		
Fixed Fee	Base Pd.			

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-14

Work Assignment

☐ Original ☒ Amendment Number: 3Contract Number
EP-W-09-024

Contract Period

Base X

Option Period Number

Title of Work Assignment

"Measurement and Evaluation Plan for the
E3 (Economy, Energy, and the Environment)
Initiative"

Contractor

BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW

See the attached Statement of Work

Purpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out☒ Work Assignment Amendment ☐ Incremental Funding☐ Work Plan Approval

Periods of Performance

From: 11/18/09

To: 06/22/10

Comments:

The purpose of this amendment is to decrease the Professional Labor Hours allocated for
this Work Assignment to 572. No other changes are made.☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$197,536.00	577
This Action	\$0.00	(5)
Total	\$197,536.00	572

Work Plan / Cost Estimate Approvals

Contractor WP Dated :	Cost/Fee:	LOE-5
Cumulative Approved:	Cost/Fee: \$197,536.00	LOE: 572

Work Assignment Manager Name

REBECCA S. COOL

Branch/Mail Code 7409M

Phone Number (202) 564-9138

Fax Number (202) 564-8901

(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

(Signature)

(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

(Signature)

(Date)

Contracting Official Name

CHRISTINE EDWARDS

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment) Initiative"

Contract: EP-W-09-024, Work Assignment: 0-14, Amendment: 0003

Summary Information

Title: "Measurement and Evaluation Plan for the E3
(Economy, Energy, and the Environment) Initiative"
Period of Performance: From: 11/18/09
To: 06/22/10
Award Date: 11/18/09
Total Funding:

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 577 to 572.



Work Assignment

☐ Original ☒ Amendment Number: 2Contract Number
EP-W-09-024Contract Period
Base X

Option Period Number

Title of Work Assignment
"Measurement and Evaluation Plan for the
E3 (Economy, Energy, and the Environment)
Initiative"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See the attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 11/18/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 18 May 2010, at a cost of \$99,010.00. Currently, there are 577 labor hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$98,526.00	515
This Action	\$99,010.00	62
Total	\$197,536.00	577

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 05/18/10	Cost/Fee: \$99,010.00	LOE: 62
Cumulative Approved:	Cost/Fee: \$197,536.00	LOE: 577

Work Assignment Manager Name

Branch/Mail Code 7409M

REBECCA S. COOL

Phone Number (202) 564-9138

(Signature)

(Date)

Fax Number (202) 564-8901

Project Officer Name

Branch/Mail Code 7404T

SINETA WOOTEN

Phone Number (202) 566-0501

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(Date)

Fax Number (202) 566-0469

Other Agency Official Name

Branch/Mail Code

Phone Number

(Signature)

(Date)

Fax Number

Contracting Official Name

Branch/Mail Code 3803R

CHRISTINE EDWARDS

Phone Number (202) 564-2182

(Signature)

(Date)

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment) Initiative"

Contract: EP-W-09-024, Work Assignment: 0-14, Amendment: 0002

Summary Information

Title: "Measurement and Evaluation Plan for the E3
(Economy, Energy, and the Environment) Initiative"
Period of Performance: From: 11/18/09
To: 06/22/10
Award Date: 11/18/09
Total Funding:

WA Totals

The following item(s) have been modified:

Category	POP	From	By	To
Estimated Cost	Base Pd.			
Fixed Fee	Base Pd.			

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 515 to 577.

United States Environmental Protection Agency
Washington, DC 20460Work Assignment Number
0-14

Work Assignment

☐ Original ☒ Amendment Number: 1Contract Number
EP-W-09-024Contract Period
Base ☒

Option Period Number

Title of Work Assignment
"Measurement and Evaluation Plan for the
E3 (Economy, Energy, and the Environment)
Initiative"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See the attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 11/18/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan at a cost of \$98,526.00.
Currently, there are 515 Professional Labor Hours approved for this Work Plan.☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	\$0.00	453
This Action	\$98,526.00	62
Total	\$98,526.00	515

Work Plan / Cost Estimate Approvals

Contractor WP Dated :03/12/10	Cost/Fee: \$98,526.00	LOE: 62
Cumulative Approved:	Cost/Fee: \$98,526.00	LOE: 515

Work Assignment Manager Name

Branch/Mail Code 7409M

REBECCA S. COOL

Phone Number (202) 564-9138

(Signature)

(Date)

Fax Number (202) 564-8901

Project Officer Name

Branch/Mail Code 7404T

SINETA WOOTEN

Phone Number (202) 566-0501

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(Date)

Fax Number (202) 566-0469

Other Agency Official Name

Branch/Mail Code

Phone Number

(Signature)

(Date)

Fax Number

Contracting Official Name

Branch/Mail Code 3803R

CHRISTINE EDWARDS

Phone Number (202) 564-2182

(Signature)

(Date)

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment) Initiative"

Contract: EP-W-09-024, Work Assignment: 0-14, Amendment: 0001

Summary Information

Title: "Measurement and Evaluation Plan for the E3
(Economy, Energy, and the Environment) Initiative"
Period of Performance: From: 11/18/09
To: 06/22/10
Award Date: 11/18/09
Total Funding:

WA Totals

The following item(s) have been added:

Category	POP	Amount
Estimated Cost	Base Pd.	\$ (b)(4)
Fixed Fee	Base Pd.	

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 453 to 515.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-1

Work Assignment

☒ Original ☐ Amendment Number:

Contract Number
EP-W-09-024

Contract Period
Base X

Option Period Number

Title of Work Assignment
"Measurement and Evaluation Plan for the
E3 (Economy, Energy, and the Environment)
Initiative"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See the attached Statement of Work

Purpose: ☒ Work Assignment Initiation ☐ Work Assignment Close-Out
☐ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 11/17/09

To: 06/22/10

Comments:
Work Assignment Initiation

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period: Cost/Fee LOE
Previously Approved

This Action

Total \$0.00 453

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: \$0.00 LOE: 453

Work Assignment Manager Name

REBECCA S. COOL

(Signature)

(Date)

Branch/Mail Code 7409M

Phone Number (202) 564-9138

Fax Number (202) 564-8901

Project Officer Name

SINETA WOOTEN

(Signature)

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Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment) Initiative"

Contract: EP-W-09-024, Work Assignment: 0-14

Summary Information

Title: "Measurement and Evaluation Plan for the E3
(Economy, Energy, and the Environment) Initiative"
Period of Performance: From: 11/17/09
To: 06/22/10
Award Date:
Total Funding:

Procurement Management Roles

WORK ASSIGNMENT MANAGER:

U.S. E.P.A.
Attn: REBECCA S. COOL
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Fax Number: (202) 564-8901
E-Mail Address: cool.rebecca@epa.gov

Attachments

Attachment Name

Measurement and Evaluation Plan for the E3 (Economy, Energy, and the
Environment) Initiative

Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment)

Contract: EP-W-09-024, Work Assignment: 0-14

Contract Number: EP-W-09-024

Work Assignment: 0-14

Title: Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment) Initiative.

Purpose:

This work assignment will provide support for the development of a Measurement and Evaluation Plan for the E3 (Economy, Energy, and Environment) Initiative

I. Background:

The E3 initiative is a collaboration among the U.S. EPA, the Department of Energy, the Department of Commerce, the Department of Labor, and the Small Business Administration to bring economic prosperity, energy efficiency, and environmental stewardship to communities. This initiative involves city government, local environmental and lean experts, a local utility, utility customers and/or suppliers, and federal agencies. It pulls together federal, state and local resources to provide technical assistance in lean and clean, energy efficiency and carbon foot-printing to utility customers and/or suppliers to reduce the environmental impact on a community-wide basis.

The initiative integrates the EPA's Green Suppliers Network 'lean and clean' process review with the Department of Energy's on-site energy audit into one customized technical review. Manufacturers receive a detailed report with specific strategies for reducing their waste and using materials and energy more efficiently. Through the EPA's Climate Leaders program, manufacturers also receive a Greenhouse Gas Evaluation that includes on site technical resources to help them establish their own carbon footprint, using the Climate Leaders new simplified GHG calculator.

Under this initiative, pilot projects are currently being conducted in San Antonio, Texas, and Columbus, Ohio, and are being supported in large part by the Manufacturing Extension Partnership program of NIST and its contractor, and the Department of Energy's Industrial Technologies Program and its network of Industrial Assessment Centers.

The outcome of a one-day workshop on measuring "technical assistance program effectiveness", currently planned for mid-November 2009, should be extremely helpful in developing a Measurement and Evaluation Plan for E3. The results of this workshop will be made available to the contractor to use in development of the measurement and evaluation plan for E3.

This workshop will assemble a small group of experts in the field of measuring "technical assistance program effectiveness". These technical assistance programs include both pollution prevention as well as energy efficiency programs. The objectives of this workshop are to:

- Examine the current state of thinking about how program effectiveness can be/is

Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment)

Contract: EP-W-09-024, Work Assignment: 0-14

- being measured, for programs seeking to influence business and individual behavior with respect to energy efficiency and environmental management.
- Explore the development of predictive models of program impact which might help program managers better understand the relationship between programmatic activities, such as outreach, education, network creation, and desired environmental/energy outcomes.
 - Determine what data are required to construct or operate such models, and identify gaps in current data collection practices.
 - To identify key functional attributes/requirements of future data systems intended to manage the effectiveness of such programs.

II. Scope of Work:

Task 1: Measurement and Evaluation Plan for E3

The contractor shall assemble a workgroup of technical experts in the field of program effectiveness measurement. The individuals selected by the contractor shall be provided to the WAM for approval. This workgroup shall meet between 3-5 times during the performance period of the contract.

Using the recommendations of the technical experts workgroup, as well as the recommendations of the conference described above, the contractor shall develop a draft blueprint for the 5 federal agencies (EPA, DOE, DOC/NIST/MEP, DOL, and the SBA) participating in the E3 initiative that identifies the most appropriate ways to collect direct impacts data. This blueprint will address the individual reporting requirements of all 5 agencies as well as the collective reporting requirements for E3. The contractor shall verify the recommended approach with various local technical assistance providers. Based on the feedback received, the contractor shall develop final recommendations on the most effective information gathering devices to collect information necessary to fully evaluate the effectiveness of the E3 program. This blueprint shall assist in the development of a sophisticated data collection instrument that shall demonstrate direct causal links for all E3 impacts including, energy and environmental outcomes.

Task 2: Forecasting Tools

The contractor shall develop a set of forecasting tools that will help program managers project the outcomes of different program investment options and strategies.

Task 3: Measurement Implementation

The contractor shall lead, or participate in, the implementation of the E3 program measurement system (likely with an implementation partner).

III. Deliverables:

Measurement and Evaluation Plan for the E3 (Economy, Energy, and the Environment)

Contract: EP-W-09-024, Work Assignment: 0-14

Task	Deliverable	Due Date
	Work Plan	15 calendar days after contractor receives the work assignment
1	Documented Measurement and Evaluation Plan	30 days following approval of the work plan
2	Forecasting Tools	60 days following the approval of the work plan
3	Implementation of Measurement System	90 days following the approval of the work plan

This work assignment relates to Tasks II. Data Analysis of the current Statement of Work (SOW) of the contract.

IV. Period of Performance:

This work assignment will start on the date of the contracting officer's signature and extend through June 22, 2010.

V. Level of Effort:

This work assignment shall require 453 professional hours.

VI. EPA Contacts:

Contracting Officer Representative:

Rebecca S. Cool

Pollution Prevention Division (7409M)

Voice: 202-564-9138

Fax: 202-564-8901

Email: cool.rebecca@epa.gov

Mailing Address:

1200 Pennsylvania Ave. NW
Washington, DC 20460

Delivery Address:

Room 5303EE, EPA East
1201 Constitution Ave. NW
Washington, DC 20004



0-1

Work Assignment

☐ Original ☒ Amendment Number: 1Contract Number
EP-W-09-024Contract Period
Base ☒ Option Period NumberTitle of Work Assignment
"Enhance EPA's Hierarchical Bayesian
Space-Time Model (HBM) to Improve
Statistical Accuracy and System
Functionality for Producing PM25 and O3
Concentration Surface Maps"Contractor
BATTELLE MEMORIAL INSTITUTESpecify Section and Paragraph of Contract SOW
See attached Statement of WorkPurpose: ☐ Work Assignment Initiation ☐ Work Assignment Close-Out
☒ Work Assignment Amendment ☐ Incremental Funding
☒ Work Plan Approval

Periods of Performance

From: 11/13/09

To: 06/22/10

Comments:

This amendment approves the Technical and Financial Work Plan dated 08 December 2009, at a cost of \$177,065.00. Currently, there are 1,270 Professional Labor Hours allocated for this Work Assignment.

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:
Previously ApprovedCost/Fee
\$0.00LOE
1,300

This Action

\$177,065.00

(30)

Total

\$177,065.00

1,270

Work Plan / Cost Estimate Approvals

Contractor WP Dated: 12/08/09

Cost/Fee: \$177,065.00

LOE: 30

Cumulative Approved: 12/31/09

Cost/Fee: \$177,065.00

LOE: 1,270

Work Assignment Manager Name

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(Signature)

(Date)

Project Officer Name

SINETA WOOTEN

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(Date)

Other Agency Official Name

Branch/Mail Code

Phone Number

Fax Number

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(Date)

Contracting Official Name

DENNIS J. BUSHTA

Branch/Mail Code 3803R

Phone Number (202) 564-9706

Fax Number (202) 565-2561

(Signature)

(Date)

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Enhance EPA's Hierarchical Bayesian Space-Time Model (HBM) to Improve Statistical Accuracy and System Functionality for Producing PM25 and O3 Concentration Surface Maps"

Contract: EP-W-09-024, Work Assignment: 0-15, Amendment: 0001

Summary Information

Title: "Enhance EPA's Hierarchical Bayesian Space-Time Model (HBM) to Improve Statistical Accuracy and System Functionality for Producing PM25 and O3 Concentration Surface Maps"

Period of Performance: From: 11/13/09
To: 06/22/10

Award Date: 11/13/09

Total Funding:

WA Totals

The following item(s) have been added:

Category	POP	Amount
Estimated Cost	Base Pd.	\$ (b)(4)
Fixed Fee	Base Pd.	

WA Classification

The following changes have occurred:

The Labor Hour Ceiling has changed from 1300 to 1270.



United States Environmental Protection Agency
Washington, DC 20460

Work Assignment Number

0-

Work Assignment

Contract Number
EP-W-09-024

Contract Period
Base ☒ Option Period Number

☒ Original ☐ Amendment Number:

Title of Work Assignment
"Enhance EPA's Hierarchical Bayesian
Space-Time Model (HBM) to Improve
Statistical Accuracy and System
Functionality for Producing PM25 and O3
Concentration Surface Maps"

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See attached Statement of Work

Purpose: ☒ Work Assignment Initiation ☐ Work Assignment Close-Out
☐ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance

From: 11/13/09

To: 06/22/10

Comments:
Work Assignment Initiation

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period:
Previously Approved

Cost/Fee

LOE

This Action

Total \$0.00

1,300

Work Plan / Cost Estimate Approvals

Contractor WP Dated:

Cost/Fee:

LOE:

Cumulative Approved:

Cost/Fee: \$0.00

LOE: 1,300

Work Assignment Manager Name

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(Signature)

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Fax Number

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Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Enhance EPA's Hierarchical Bayesian Space-Time Model (HBM) to Improve Statistical Accuracy and System Functionality for Producing PM25 and O3 Concentration Surface Maps"

Contract: EP-W-09-024, Work Assignment: 0-15

Summary Information

Title: "Enhance EPA's Hierarchical Bayesian Space-Time Model (HBM) to Improve Statistical Accuracy and System Functionality for Producing PM25 and O3 Concentration Surface Maps"

Period of Performance: From: 11/13/09
To: 06/22/10

Award Date:

Total Funding:

Procurement Management Roles

WORK ASSIGNMENT MANAGER:

U.S. E.P.A.
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Attachments

Attachment Name

SOW

Contract EP-W-09-024**Work Assignment Number: WA 0-15**

Work Assignment Title: "Enhance EPA's Hierarchical Bayesian Space-Time Model (HBM) to Improve Statistical Accuracy and System Functionality for Producing PM_{2.5} and O₃ Concentration Surface Maps"

STATEMENT OF WORK**I. BACKGROUND**

In a previous contract (EP-D-04-068, Work Assignment #54), the contractor, in conjunction with EPA, developed a hierarchical Bayesian Graphical User Interface (GUI)-based computer model for producing spatial maps of ambient air concentrations for pollutants (ozone [O₃] and fine particulate matter [PM_{2.5}]) using data from two sources, air quality monitors and air quality model estimates. The version of the Hierarchical Bayesian Space-Time Model (HBM) developed under the previous contract combines/'fuses' ambient air concentration measurement data from EPA's Air Quality System (AQS) air quality monitors and estimates from air quality models to maximize the advantages offered by both data sources while minimizing the disadvantages of each when predicting concentrations of fine particulate matter (PM_{2.5}) and ozone (O₃) throughout the US. Air quality models, such as the Community Multi-Scale Air Quality Model (CMAQ) and the Comprehensive Air Quality Model with Extensions (CAMx) provide estimates of the spatial and temporal gradients of air pollution based on emissions inventories and meteorological information. These models, while providing concentration estimates for large spatial domains at relatively low cost, have been found to have large statistical biases and greater errors than that found in air quality monitoring networks. Air quality monitoring networks generally provide very accurate and unbiased results. However, because air quality monitoring networks are sparsely populated and monitors tend to be located (i.e., concentrated or 'clustered') over small spatial domains, they are not able to produce concentration estimates which are valid for large spatial domains.

HBM requires a user knowledgeable in how to prepare the required model input data files and how to select key model parameter inputs to configure and run a model simulation to produce an estimated pollutant concentration surface. To streamline the set-up of the model, the EPA developed the HBM model to allow the user to: a) prepare the input data files for the model run; b) choose the specifications for a model run; c) implement the model run; d) obtain model output files which are used to generate the estimated concentration surfaces, and; e) run a set of validation procedures to compare the completed HBM run with: 1) a standard statistical method (kriging), and; 2) an air quality model estimate (i.e., from CMAQ). HBM predicts the distribution of air pollution levels within specified regions of the U.S. (city, MSA, county, state, entire U.S.) for consecutive 24-hour intervals within a given time period (one day up to one-year). Generating multiple annual model runs provides HBM model outputs for different years. EPA makes

HBM model predictions/estimates available to interested parties who require an accurate characterization of air pollution concentrations for a variety of applications, such as: a) determining the relationship between ambient air concentrations for PM_{2.5} and O₃ and public health outcomes (i.e., excess hospitalizations for asthma and occurrences of myocardial infarction), and; b) developing emissions control strategies for reducing air pollution levels. EPA provides its HBM model output to the Centers for Disease Control and Prevention (CDC) for its use in the National Environmental Public Health Tracking Network (EPHTN). One major goal of the EPHTN is to link well-characterized EPA air quality data with CDC's public health surveillance (tracking) data to better understand how different air pollution concentration levels affect non-infectious diseases and illnesses. EPA's objective is to provide highly accurate ambient air concentration estimates to support human health research and analysis of the effectiveness of emission control strategies. In order to successfully meet these research objectives, EPA must continually enhance the quality of the concentration surface estimates from the HBM model to ensure optimal spatial and temporal characterization of ambient air concentrations across the U.S. This Work Assignment (WA) has been developed with that goal in mind.

TSCA CBI is not required for this WA.

A QAPP is required for this WA.

This WA relates to Task I (Page 2), Task II (Page 4 and 5), Task III (Page 5, 6 and 7), and Task V (Page 8) of the contract's SOW.

II. PURPOSE

The purpose of this WA is to enhance the ability of EPA's HBM model, a computer-based statistical (Bayesian) model, to produce estimates of ambient concentrations of pollutants (PM_{2.5} and O₃) for health research efforts, regulatory support analyses, and analysis of emission control strategies. HBM will be used to generate analysis reports in support of risk assessments to: a) compare CMAQ-generated and CAMx-generated HBM estimates; b) compare PM_{2.5} ambient concentration estimates generated using – i) EPA's Federal Reference Method (FRM) monitors, and; ii) EPA's Federal Reference Method (FRM) monitors and EPA's Federal Equivalence Method (FEM) semi-continuous (hourly) monitors; c) accurately determine the location of adverse health outcomes with respect to air quality monitor locations and HBM model estimates in selected regions. The most efficient way to complete the tasks included below in this WA is to utilize, upgrade and enhance the following products that were delivered under **Contract EP-D-04-068, WA #54**: 1) the HBM model source code; 2) the HBM model executable code, and; 3) the documentation (User's Guide, Software Architecture and Design Document, 'Plain Language Document', PowerPoint presentation, etc.) used to describe, design, and operate the HBM model.

This shall be accomplished through the following contractor-implemented activities, which shall include but not be limited to: a) adding the capability to incorporate and utilize a second air quality model, the Comprehensive Air Quality Model with Extensions

(CAMx), as an input to the HBM model (using resources previously provided by the EPA WA Manager (WAM) in Contract EP-D-04-068, WA #54); b) adding the capability to select/utilize new statistical software (i.e., R, S-Plus, SPSS, Microsoft Excel Spreadsheet, etc.) along with the current default statistical software (SAS) in the 'Launch Validation' component of the HBM model; c) adding the capability to incorporate ESRI GIS-compatible shapefiles (i.e., *.shp, *.shx, and *.dbf files) - the objective is to provide HBM output report data in a format compatible with GIS tools and usable in GIS maps and other GIS applications; d) adding the capability to incorporate Google Earth-compatible files (i.e., *.kml and *.kmz format) - the objective is to provide HBM output report data in a format compatible with and usable in Google Earth applications; e) adding the capability to utilize semi-continuous air quality monitors (i.e., Tapered Element Oscillating Microbalance - TEOM, etc.) with the current Federal Reference Method (FRM) monitors (in the HBM input files - AQS *.txt files) to calculate the ambient air concentration of PM_{2.5} (the EPA WAM will provide SAS code and documentation [technical report, mini user guide, etc.] to support this activity); f) adding the capability to check the output of the HBM 'special' files (i.e., addll.exe, cmaqpm25.exe, cmaqpm25O3.exe, monO3.exe, monpm25.exe) to determine if either alphabetic characters or negative numbers are included in the output of these files and to modify the output of those files if those types of values are found; g) adding the capability to allow the user to select HBM output as: i) log-transformed concentration data (current format), ii) actual concentration values (new format), iii) both formats i) and ii); h) adding the capability of operating the HBM model under the Linux Operating System (i.e., produce a separate Linux-capable version of the HBM model); i) modifying the current functionality of the HBM model in the 'Choose Time/Grid', 'Prepare Model Input Data', 'Model Specification', 'Launch Model', and 'Launch Validation' functional areas as specified in Task 4 of this WA, to improve functionality of the HBM model; j) modifying the HBM documents (i.e., 1) **User Guide - Hierarchical Bayesian Space-Time Modeling of Air Pollution Data**; 2) **Hierarchical Bayesian Model Software Architecture/Design Document**; 3) **Overview of EPA's Hierarchical Bayesian model for Predicting Air Quality Patterns in the United States Over Space and Time, For Use With Public Health Tracking Data**, aka the "**Plain Language Document**", **HBM PowerPoint Presentation**, etc.), developed under Contract EP-D-04-068, WA #54, as a result of modifications to the HBM model source code (software) and technical direction from the EPA WAM; k) develop a draft journal article manuscript based on the (statistical) comparison between HBM model output for: i) CMAQ, and; ii) CAMx; l) responding to on-going technical direction from the EPA WAM which is provided to further clarify implementation details for the WA tasks given below.

III. RESOURCES PROVIDED FOR/UTILIZED FOR WA

The contractor shall use the documents developed previously under contract EP-D-04-068, WA #54, as the initial basis for technical information required to generate analysis reports to support risk assessments using the HBM model (i.e.: i) **User Guide - Hierarchical Bayesian Space-Time Modeling of Air Pollution Data**; ii) **Hierarchical Bayesian Model Software Architecture/Design Document**; iii) **Overview of EPA's Hierarchical Bayesian Model for Predicting Air Quality Patterns in the United States Over Space and Time, For Use With Public Health Tracking Data**, aka the "**Plain**

Language Document", HBM PowerPoint Presentation, etc.). The contractor shall use the HBM model software code developed under contract **EP-D-04-068, WA #54**, (i.e., Version **5-4h.0.1.21**) as the initial basis for implementing new HBM model capabilities to support generation of analysis reports to support risk assessments under this current WA.

EPA will provide additional information resources to the contractor for use in this WA (i.e., i) EPA-provided model software code, and; ii) EPA-provided documentation), developed under other EPA research efforts, as noted in **Task 4** below. The EPA-provided information will consist primarily of draft technical report documentation, and preliminary model code developed through a previous EPA research project. The EPA WAM-provided documentation will be a 'working draft' of an EPA Technical Report currently undergoing internal EPA review and is not releasable to third-parties outside of this WA without approval of the EPA WAM. The contractor shall not use the EPA-provided information (model code or documentation) on any project or effort outside of this current WA, nor shall the contractor transfer, copy, or transmit any of the EPA-provided information to any person, group, or project outside of this WA without the prior, express written consent of the EPA WA Manager (WAM) for this current WA. The EPA WAM will provide the information to the contractor either via CD-ROM/DVD (if the files are too large for e-mail transmission), e-mail transmittal, or the contractor's file-exchange mechanism.

The contractor shall not make any additional electronic copies of the EPA-provided information without prior approval of the EPA WAM, but can distribute hard copies where required to its personnel assigned to this WA. The contractor shall not retain its copy of the EPA-provided information (model code or documentation) past the end of the period of performance of this current WA. At the conclusion of this WA, the contractor shall send an e-mail message to the EPA WAM stating that all copies of the EPA-provided information (electronic copy and any hard copies) for this WA have been destroyed and have not been retained for further use. None of the information provided by EPA is expected to contain Confidential Business Information (CBI), either in general or specific to the Toxic Substances Control Act (TSCA). If CBI must be used, EPA will amend the WA before transmitting the information. In addition, the EPA WAM for this WA will provide written and verbal technical direction to the contractor on use of the EPA-provided information in a manner consistent with that which was specified under contract **EP-D-04-068, WA #54**.

IV. SCOPE OF WORK

The EPA WAM will identify specific WA deliverables, their corresponding delivery dates, and will provide technical direction regarding the tasks/subtasks of the WA in the sections listed below. The EPA WAM will supplement the technical direction provided in this scope of work with clarifying directives provided primarily through written technical direction. Any verbal technical direction provided by the EPA WAM to the contractor will be followed by subsequent written (e.g., e-mail, facsimile, memo, letter, etc.) technical direction. The contractor shall maintain a file of all written and verbal technical direction received from the EPA WAM under this WA. The technical direction provided by the EPA WAM under this WA shall apply to each task and subtask element

in this WA. The contractor shall not initiate action on any portion of this WA without prior written approval (e.g., e-mail, facsimile, memo, letter, etc., including technical direction) from the EPA WAM. The contractor's workplan must be approved by the EPA WAM before any activity is initiated on this WA.

Task 1: Work Plan - (Contract SOW Task I, Task II, Task III, Task V)

The contractor shall prepare and deliver a detailed workplan to address completion of each task and subtask in this WA NLT 20 days after award of this WA. The workplan shall include as a minimum a cost estimate (i.e., dollars and man-hours) and shall be structured by WA task and subtask (where applicable) along with a description of the required activities to complete each task and subtask (where applicable) of this WA. The workplan shall be prepared in the same manner as was accomplished in **Contract EP-D-04-068, WA #54**.

Task 2: Quality Assurance for Software/Model Development - (Contract SOW Task V)

The contractor shall incorporate the provisions of the PMRB Software Development QA Guidance Document in its entirety by reference into the workplan of this WA in the same manner as was accomplished in **Contract EP-D-04-068, WA #54**. The contractor shall implement the required software quality assurance guidance in the PMRB Software Development QA Guidance Document (as incorporated into the workplan) into the activities of this WA during the period of performance of this WA. The contractor shall prepare and deliver a Category IV (Cat IV) Software Development QAPP for this WA in conjunction with the workplan, based on the QAPP developed under **Contract EP-D-04-068, WA #54**. The contractor shall revise the QAPP developed under **Contract EP-D-04-068, WA #54** to address the model development work for this WA. The contractor shall incorporate the provisions of the PMRB Software Development QA Guidance Document in its entirety by reference into the Software Development QAPP for this WA. The contractor shall deliver the Software Development QAPP for this WA concurrently with delivery of the workplan for this WA (i.e., no later than 20 days after award of this WA).

Task 3: General Support - (Contract SOW Task I, Task II, Task III, Task V)

The contractor shall provide technical support to the EPA WAM by providing recommendations concerning strategies, methodologies, and techniques for developing analysis reports to support risk assessments based on: **a)** performing model development activities for HBM; **b)** revising HBM model documentation; **c)** performing analysis of HBM model output, and; **d)** determining resource utilization required to implement this WA. The contractor shall prepare and submit to the EPA WAM (in a manner consistent with **Contract EP-D-04-068, WA #54**): **(1)** a written estimate (for each task/subtask) of the magnitude of all HBM code changes (e.g., provide approximate number of modified lines of code, number of modified modules/classes, etc.) which includes a list of the source code modules (and code segments) that must be modified; **(2)** a CD-ROM/DVD (i.e., non-write protected, non-copy protected disk) containing each modified source code

module (and code segment) that was revised to implement the changed/added/modified HBM model capability; (3) the number of man-hours and dollar costs required to implement each code change/addition/modification, and; (4) the impact of all HBM code changes/additions/modifications on the affected HBM model documents (i.e., section(s) modified, manhour cost, dollar cost). The contractor shall prepare and incorporate the complete estimate for each WA task/subtask into the workplan [e.g., include (1), (2), (3) and, (4) above in the workplan]. The contractor shall implement changes to the HBM model software code and the affected sections of HBM documentation in a manner consistent with **Contract EP-D-04-068, WA #54**, based on technical direction from and final approval of the EPA WAM.

Task 4: Modify HBM Model Source Code - (Contract SOW Task II)

The contractor shall implement changes/additions/modifications to the HBM model software source code to enhance its ability to provide statistically-derived estimates of ambient air concentrations for criteria pollutants ($PM_{2.5}$ and O_3) for use in health research and regulatory support/emission control analyses. The EPA WAM will provide technical direction to the contractor on all HBM model software source code changes. The contractor shall implement the changes/additions/modifications to the HBM model software source code in a manner consistent with **Contract EP-D-04-068, WA #54**. The contractor shall implement the subtasks listed below which shall include but not be limited to the following:

- a) Modify the '**Choose Time/Grid**' functionality of the HBM model software code to allow users to directly select the desired year for simulation as the first action, and subsequently allow the user to select the timeframe (i.e., months) within the year, over which the simulation is to be run, as the second action.
- b) Modify the '**Choose Time/Grid**' functionality of the HBM model software code to ensure that when the user selects a folder to save all *.CSV files, that the values for the 'end date of the study period' from previous model runs are saved/retained.
- c) Modify the '**Choose Time/Grid**' functionality (**Apply State or Region to Grid**) of the HBM model software code to address the following issue: all states are currently available for selection on the initial screen; when states are applied to a grid, the closest grid cell to the lower left and upper right "corners" of the state are determined - there is always a closest cell, therefore every state has a corresponding grid region; not all of the grids completely cover the continental United States, so it is possible for the HBM model grid domain to exclude a portion of (or all of) a selected state; the situation for the 12km grid is described herein: **i) parts of the following states lie outside the 12km grid**; Montana, Wyoming, Colorado, New Mexico; **ii) the entire area of the following states lie outside the 12km grid**; Idaho, Washington, Oregon, California, Nevada, Arizona, Utah; as a minimum, the HBM model software code should detect these situations and provide a warning/notice message to the user when this situation occurs; when a user selects a state that lies entirely outside the selected grid, the HBM model software code should provide a warning message and disallow the selection; when a user selects a state that lies partially outside the selected grid,

the HBM model software code should provide a warning message but permit the user to select the portion of the state that lies within the selected grid.

- d) Modify the **'Prepare Model Input Data'** functionality of the HBM model software code to allow the user to have the ability to create *.CSV files or utilize existing *.CSV files for model runs.
- e) Modify the **'Prepare Model Input Data'** functionality (**Creating Monitor and CMAQ Files**) of the HBM model software code to address the following issue: when a file name is entered at this point, and the user goes to Step 1 (**Choose Time/Grid**), then returns to Step 2 (**Prepare Model Input Data**), the file name is lost or restored to the default value; the HBM model software code needs to save/retain the file/filename created in this step (Step 2).
- f) Modify the **'Model Specification'** functionality (display) of the HBM model software code to change the name of the first 'Priors' tab from 'Priors' to **'Priors-Spline'**.
- g) Modify the **'Model Specification'** functionality (display) of the HBM model software code to change the name of the second 'Priors' tab from 'Priors' to **'Priors-Tau/Rho'**.
- h) Modify the **'Model Specification'** functionality of the HBM model software code to store, retain, and display the values entered in Step 1 (i.e., Choose Time/Grid for "Bias Spline Max" for T, X, and Y) in the display of the first 'Priors' tab.
- i) Modify the **'Model Specification'** functionality of the HBM model software code to allow the user to enter TauX and TauY in terms of the **coefficient of variation (CV)** (in percent) and create an algorithm in the model to calculate the gamma function parameters (shape and rate) from those TauX and TauY values entered as CV (percent) values.
- j) Modify the **'Model Specification'** functionality (**Grid Information**) of the HBM model software code to address the following issue: the first two tabs displayed in this step provide grid information; the T (time) is 'protected' on the first tab; its value cannot be changed in this tab. Its value can be changed in the second tab; saving information in this step (a *.PAR file) does not update the information given in Step 1 information; the HBM model software code should: **i)** allow all grid information to be editable on the first tab, and not editable on the second tab; **ii)** ensure that any changes made to the grid information on the first tab are automatically propagated to the second tab to synchronize the values; **iii)** ensure that when a *.PAR file is saved in this step (Step 3), the grid information is propagated to Step 1.
- k) Modify the **'Model Specification'** functionality (**Inputs**) of the HBM model software code to address the following issue: when input file names are entered in Step 3 and then the user moves to Step 2, the file names in Step 3 are changed to

what is stored/retained in Step 2; the HBM model software code should only update file names in Step 3 if Step 2 is actually implemented/executed, not if the user moves to Step 2 only to view data.

- l) Modify the '**Model Specification**' functionality (4th **Highest**) of the HBM model software code to address the following issue: when information is entered in the 4th highest tab, the information is lost if the user moves to Step 2; the HBM model software code should ensure that the 4th highest information is retained.
- m) Modify the '**Launch Model**' functionality of the HBM model software code to address the following issue: currently, the HBM model output provides the log-transformed concentration values and log-transformed standard error values (i.e., PredAvg, PredStd, and ComputerData); researchers (i.e., epidemiologists, exposure scientists, public health analysts, etc.) who use the HBM model output for human health studies can not use the log-transformed concentration (and standard error) data values from the model as currently provided in HBM's model output; users are currently required to manually calculate the inverse log of the log-transformed HBM model data output values to obtain the predicted concentration values they need for their research; the HBM model software code should: i) calculate the inverse log of the log-transformed concentration (and standard error) data values from the current HBM model data output values; ii) provide the 'inverse log' calculated values (i.e., actual concentration values and standard error values) to the user as a direct output from the HBM model, for health studies; iii) allow the user to select: a) the current output (log-transformed data); b) the actual concentration (and standard error) values, or; c) both a) and b).
- n) Modify the '**Launch Validation**' functionality of the HBM model software code to allow use of additional statistical software packages (i.e., R, SPSS, S-Plus, Microsoft Excel) to validate the HBM model output.
- o) Modify the '**Launch Validation**' functionality of the HBM model software code to allow the user to create/generate the network and kriging files used in the validation process.
- p) Modify the HBM model software code to include the functionality to read "*.ioapi" (NetCDF format) files from the CAMx air quality model. The contractor shall use the source code and document resources (including technical direction e-mails) provided by the EPA WAM under **Contract EP-D-04-068, WA #54**. The EPA WAM will provide the most current version of the CAMx User's Guide (dated March 2009) as a reference document for this activity. **Note:** CAMx also has a 4 km grid domain. The contractor shall implement this task in a manner consistent with the approach implemented under **Contract EP-D-04-068, WA #54**.
- q) Modify the HBM model software code to display the HBM model '3-dimensional' concentration surface outputs in the following manner: i) provide a scale along the latitude axis of the concentration surface display providing appropriate latitude value divisions for the selected region; ii) provide a

legend/scale along the longitude axis of the concentration surface display providing appropriate longitude value divisions for the selected region; iii) provide a legend/scale along the vertical axis providing appropriate concentration values (and units) for the selected region; the implementation should permit the user to display a concentration surface with the labeled axes shown (default) or without the labeled axes.

- r) Modify the HBM model software code to incorporate semi-continuous, Federal Equivalent Method (FEM) monitors for PM_{2.5} in the HBM model monitor input files (*.txt files), which currently contain only the Federal Reference Method (FRM) monitors for PM_{2.5} (and their associated concentration measurements) from EPA's Air Quality System (AQS); the EPA WAM will provide SAS model software code that 'converts' (translates) concentration measurement values from semi-continuous PM_{2.5} monitors to 'equivalent' FRM concentration measurement values for PM_{2.5}; incorporation of this capability will provide more robust spatial coverage of PM_{2.5} monitor measurements for human health studies; the EPA WAM will also provide documentation (i.e., draft technical report, mini user's guide, etc.) to support this activity.
- s) Modify the HBM model software code to check the output of the 'special' files used by the HBM model software (i.e., **addll.exe**, **cmacqpm25.exe**, **cmacqpm25O3.exe**, **monO3.exe**, **monpm25.exe**) to determine if the output of these files contain either alphabetic characters or negative numbers; in the situation where the output of these files is either an alphabetic character or a negative number, the contractor shall develop an algorithm to process those values to ensure that the HBM model software shall continue to process the file outputs and generate valid, usable concentration surface outputs.
- t) Modify the HBM model software code to facilitate generation of ESRI GIS-compatible shapefiles (i.e., *.shp, *.shx, and *.dbf files) from HBM model output (CMAQ and CAMx [when implemented]); the following weblinks are provided as technical reference and information sources to support implementation of this task: http://www.cmascenter.org/conference/2006/abstracts/wheeler_session2a.pdf and <http://www.verdi-tool.org/>; the objective of this subtask is to provide HBM model output in an alternate (additional) format that will facilitate its ability to be manipulated using GIS tools and facilitate the integration of HBM model output into GIS maps and other GIS applications.
- u) Modify the HBM model software code to facilitate generation of Google Earth-compatible files (i.e., *.kml and *.kmz format) from HBM model output (CMAQ and CAMx [when implemented]); the objective of this subtask is to provide HBM model output in an alternate (additional) format that will facilitate its ability to be manipulated in and displayed in Google Earth and related applications.
- v) **Develop a Linux Version of the HBM Model Software Derived From the Windows XP Version of the HBM Model Software.** The contractor shall develop the required modifications to implement the HBM model software functionality under the Linux Operating System. The contractor shall investigate Linux versions (distributions)

that will allow the HBM model software to operate in both 32-bit and 64-bit modes under the Linux Operating System. The contractor shall use the resources (including technical direction e-mails) provided by the EPA WAM under **Contract EP-D-04-068, WA #54** (read the following webpage for assistance on this subtask: (http://www.mono-project.com/Main_Page)). The contractor shall implement this task in a manner consistent with the approach planned for implementation under **Contract EP-D-04-068, WA #54**.

Task 5: Produce HBM Model-Derived Analysis Reports - (Contract SOW Task I, Task II, III)

The contractor shall implement changes/additions/modifications to the HBM model software source code developed under **Contract EP-D-04-068, WA #54**, to enhance its ability to provide analysis reports to support risk assessments. The EPA WAM will provide technical direction to the contractor on all HBM model software source code changes. The contractor shall implement the changes/additions/modifications to the HBM model software source code in a manner consistent with **Contract EP-D-04-068, WA #54**.

The upgraded/modified/changed HBM software shall facilitate generation of the following analysis reports listed below as a minimum:

- a) Report comparing HBM model validation output using SAS and other statistical software packages (i.e., R, SPSS, S-Plus, Microsoft Excel) to assess the effect on the variability of the HBM model output.
- b) Report comparing HBM model output generated using CMAQ air quality model estimates to the HBM model output generated using CAMx air quality model estimates. The contractor shall use the source code and document resources (including technical direction e-mails) provided by the EPA WAM under **Contract EP-D-04-068, WA #54**. The EPA WAM will provide the most current version of the CAMx User's Guide (dated March 2009) as a reference document for this activity. **Note:** CAMx also has a 4 km grid domain.
- c) Report comparing HBM model output generated using EPA's Federal Reference Method (FRM) monitors (**alone**) with EPA's Federal Reference Method (FRM) monitors and EPA's Federal Equivalence Method (FEM) semi-continuous (hourly) monitors (**together**). The EPA WAM will provide SAS model software code that 'converts' (translates) concentration measurement values from (FEM) semi-continuous PM_{2.5} monitors to 'equivalent' FRM concentration measurement values for PM_{2.5}. The EPA WAM will also provide documentation (i.e., draft technical report, mini user's guide, etc.) to support this activity. This report will provide information on whether or not adding FEM monitors in HBM processing will allow for more robust spatial coverage of PM_{2.5} monitor measurements for human health studies.
- d) Report to verify/validate the output HBM model software code by analyzing the output of the 'special' files used by the HBM model software (i.e., addll.exe, cmaqpm25.exe, cmaqpm25O3.exe, monO3.exe, monpm25.exe). The report

should determine if the output of these files contain either alphabetic characters or negative numbers. In situations where the output of these files consists of either an alphabetic characters and/or negative numbers, the contractor shall determine how to ensure that HBM continues to process those file outputs and generate valid, usable concentration surfaces.

e) Report to assess the spatial and temporal extent of HBM concentration estimate (concentration surface) and its location with respect to: i) EPA FRM and FEM monitors; ii) major interstates/roadways/traffic arterials; iii) urban areas; iv) major bodies of water (i.e., Great Lakes, Atlantic Ocean, Gulf of Mexico, Pacific Ocean, Mississippi River, etc.); v) census tracts/census blocks and population centers/centroids; vi) schools, hospitals, industrial facilities, etc. To generate this report, the HBM model output shall require modification to incorporate ESRI GIS-compatible shapefiles (i.e., *.shp, *.shx, and *.dbf files). This subtask shall also require use of Google Earth-compatible files (i.e., *.kml and *.kmz format). The following weblinks are provided as technical reference and information sources to support implementation of this task: http://www.cmascenter.org/conference/2006/abstracts/wheeler_session2a.pdf and <http://www.verdi-tool.org/>. The objective of this subtask is to provide HBM output report data in a format compatible with GIS tools and usable in GIS maps, other GIS applications and Google Earth applications. This will allow for improved spatial correlation between HBM estimates and locations of adverse health impacts

The EPA WAM will provide written technical direction on the required format and content of the reports for this task.

Task 6: Create/Modify HBM Model Documentation - (Contract SOW Task II, Task III)

The contractor shall implement changes/additions/modifications to the HBM model documentation (i.e.: i) **User Guide – Hierarchical Bayesian Space-Time Modeling of Air Pollution Data**; ii) **Hierarchical Bayesian Model Software Architecture/Design Document**; iii) Overview of EPA's Hierarchical Bayesian model for Predicting Air Quality Patterns in the United States Over Space and Time, For Use With Public Health Tracking Data, aka the "**Plain Language Document**", HBM PowerPoint Presentation, etc.). The changes to the program documentation shall be based on the impacts from the results of Task 4 (i.e., code changes). The EPA WAM will provide technical direction to the contractor on all document changes.

a. General Document Modification/Updates

The contractor shall modify the following HBM model documents (i.e., 1) **User Guide – Hierarchical Bayesian Space-Time Modeling of Air Pollution Data**; 2) **Hierarchical Bayesian Model Software Architecture/Design Document**; 3) Overview of EPA's Hierarchical Bayesian model for Predicting Air Quality Patterns in the United States Over Space and Time, For Use With Public Health Tracking Data, aka the "**Plain Language Document**", HBM PowerPoint Presentation, etc.), developed under Contract EP-D-04-068, WA #54; the contractor shall modify these documents as a result of modifications to the HBM model

source code (software) and on-going technical direction from the EPA WAM.

b. Develop and Produce a Draft Manuscript for a Journal Article Based on Comparison of CMAQ and CAMx Air Quality Model Input to HBM Model

The contractor shall use the results of HBM model runs/simulations using both CAMx input files and CMAQ input files as the basis for generating an initial draft of a publication-ready manuscript suitable for submission to a scientific journal (e.g., Journal of Environmental Monitoring, Atmospheric Environment, Journal of Air and Waste Management, etc.). The contractor shall use the HBM Model Software Architecture/Design Document developed under Contract **EP-D-04-068, WA #54** to provide information on the design and nominal operational behavior of the HBM Model Software. The contractor shall also use any additional resources that describe the operation of and/or the statistical basis underlying the operation of the HBM Model Software. The contractor shall conduct a review of the scientific literature to assess the results of any comparisons between CAMx and CMAQ output values for ozone (O_3) and fine particulate matter ($PM_{2.5}$) and include any relevant results in the draft manuscript. The contractor shall conduct comparisons of HBM Model runs utilizing CAMx input files and CMAQ input files for both O_3 and $PM_{2.5}$ for at least three years (i.e., 2003, 2004, and 2005). The results of the model simulation runs shall be included in the draft manuscript.

The contractor shall proceed on this subtask based on the written technical direction provided by the EPA WAM. The contractor shall provide an initial draft outline of the journal article format and content to the EPA WAM. The contractor shall incorporate technical direction from the EPA WAM on the journal article format and content. The contractor shall incorporate the results/information from the CAMx and CMAQ model simulation comparisons, HBM Model Software Architecture/Design Document, and literature review in a draft journal article manuscript. After the EPA WAM reviews the draft journal article manuscript and provides technical direction, the contractor shall incorporate the technical direction from the EPA WAM into the draft journal article manuscript and shall produce final hardcopy and electronic versions of the draft journal article manuscript for delivery to the EPA WAM. The EPA WAM will submit the journal article manuscript for review through the EPA/ORD/NERL journal article review process before submitting the journal article manuscript to the selected journal. The EPA WAM shall be designated as the primary (lead) author of the final submitted journal article manuscript. The contractor shall implement this subtask based on technical direction from and final approval of the EPA WAM. The contractor shall implement this task in a manner consistent with the approach implemented under **Contract EP-D-04-068, WA #54**.

Task 7. Deliver HBM Source Code, Executable Code, and Documentation to EPA WAM - (Contract SOW Task II, Task III, Task V)

The contractor shall modify the HBM model software code and its associated documentation developed under **Contract EP-D-04-068, WA #54** as directed in the tasks and subtasks of this WA. During the period of performance of this contract WA, the contractor shall deliver interim versions of the modified HBM model software source code, executable code, and modified documentation to the EPA WAM (in a manner consistent with **Contract EP-D-04-068, WA #54**) on a weekly basis (or as available) for the EPA WAM to review and to provide technical direction on any further modifications that may be required. Upon completion of HBM model software modifications and document modifications, the contractor shall deliver the following to the EPA WAM upon the conclusion of this WA: (a) final version of the complete (modified) HBM model software source code compatible with Windows XP Operating System (loaded onto CD-ROM[s]/DVD[s]); (b) final version of the complete (modified) HBM model software source code compatible with Linux Operating System (loaded onto CD-ROM[s]/DVD[s]); (c) final version of the complete (modified) HBM model software executable code compatible with Windows XP Operating System (loaded onto CD-ROM[s]/DVD[s]); (d) final version of the complete (modified) HBM model software executable code compatible with Linux Operating System (loaded onto CD-ROM[s]/DVD[s]); (e) final version of the complete (modified) HBM documentation (e.g., guidance document, overview document, model evaluation document, design document, test/QA document, etc., loaded onto CD-ROM[s]/DVD[s]). The contractor shall deliver: 1) the draft version of the final HBM model software source code (Windows XP versions and Linux version); 2) draft version of the final HBM model software executable code (Windows XP versions and Linux version), and; 3) the draft version of the final modified HBM documentation to the EPA WAM No Later Than (NLT) 45 calendar days prior to the end of the period of performance of this WA. The EPA WAM will review 1), 2), and 3) and will provide technical direction to the contractor. The contractor shall incorporate the technical direction from the EPA WAM into the final deliverable version of 1), 2), and 3). The contractor shall deliver the final versions of 1), 2), and 3) to the EPA WAM NLT 15 days before the end of the period of performance of this WA. The contractor shall implement this task in a manner consistent with **Contract EP-D-04-068, WA #54**.

Task 8. Prepare Monthly Progress Reports, Weekly Status Reports, Task/Subtask Estimates, and Attend Weekly Teleconference Meetings with the EPA WAM - (Contract SOW Task I, Task II, Task III, Task V)

The contractor shall prepare and submit monthly progress reports, including monthly costs, to the EPA WAM for review and approval. The contractor shall prepare and submit task/subtask estimates into the workplan, as indicated in the applicable section(s) of this WA. The contractor shall prepare and submit weekly written status reports to the EPA WAM before each weekly teleconference meeting in a manner consistent with **Contract EP-D-04-068, WA #54**. The weekly status report shall contain as a minimum: (a) the status of the HBM model software code modification activities (e.g., analysis/code/test, etc.), which shall include the modified source code listings for each proposed code fix; (b) the status of the HBM document modification activities, which

shall, as a minimum, include revised document sections; (c) number of man-hours expended on each task during the week [including (a) and (b) above]; (d) the status of WA deliverables (e.g., source code, documents, etc.) for each WA task and/or WA subtask; (e) current amount of funds expended based on (a), (b), (c), and (d). The contractor shall implement this task in a manner consistent with **Contract EP-D-04-068, WA #54**.

The EPA WAM will designate a consistent day and time for each weekly teleconference meeting, in a manner consistent with **Contract EP-D-04-068, WA #54**, and will notify the contractor of the scheduled day for each teleconference meeting upon award of the WA and approval contractor's workplan by the EPA WAM. The EPA WAM reserves the right to change the day of the weekly teleconference meeting when required. If the EPA WAM travels to the contractor location during the period of this WA, the EPA WAM visit(s) will substitute for the regularly scheduled weekly teleconference meeting. The EPA WAM will provide technical direction during the weekly teleconference meetings. Technical direction will also be provided through e-mails, facsimiles, memos, letters, etc., and through periodic site visits to the contractor's location.

Task 9. General Technical Direction - (Contract SOW Task II, Task III)

The contractor shall implement the technical direction provided by the EPA WAM during the period of performance of this WA. In situations where WA tasks/subtasks may be difficult to interpret or implement, or where the requirements for different tasks/subtasks conflict with each other, the contractor shall request guidance from the EPA WAM to resolve these situations. The EPA WAM will also provide technical direction in situations where the stated WA task(s)/subtask(s) lead to derived/implied requirements that may not be specifically detailed in the scope of work. The EPA WAM reserves the right to add, modify, or delete WA activities based changes in program requirements. The EPA WAM will review the task/subtask estimates in the workplan submitted by the contractor and will provide technical direction on how the contractor will address implementation of each WA task/subtask. The EPA WAM will provide written comments and feedback on interim versions of HBM model software model code and associated documentation to ensure that the final deliverable versions meet EPA's objectives for application of the HBM model.

VI. TRAVEL

The contractor shall not be required to travel during the period of performance of this WA. Any non-local travel directly chargeable to this WA shall be submitted to and approved by the EPA WAM prior to the travel.

VII. SCHEDULE OF DELIVERABLES

The contractor shall adhere to the following schedule unless otherwise directed by the EPA WAM (Note: **DAC** = Days after Award of Contract WA).

Activity/Deliverable**Delivery Schedule****Task 1 – Workplan**

20 DAC (Include Task/Subtask Estimates)

Task 2 – Software Development QAPP

20 DAC (Deliver with Workplan)

Task 3 – General Support

On-Going/Continuous

Task 4 – Model HBM Model Source Code - Interim Versions

Weekly/As Available

Task 4 – Model HBM Model Source Code - Draft Versions

45 Days before Period of Performance End

Task 4 – Model HBM Model Source Code - Final Versions

15 Days before Period of Performance End

Task 5 – Analysis Reports - Interim Versions

Weekly/As Available

Task 5 – Analysis Reports - Draft Versions

45 Days before Period of Performance End

Task 5 – Analysis Reports - Final Versions

15 Days before Period of Performance End

Task 6 – Create/Modify HBM Model Documentation - Interim Versions

Weekly/As Available

Task 6 – Create/Modify HBM Model Documentation - Draft Versions

45 Days before Period of Performance End

Task 6 – Create/Modify HBM Model Documentation - Final Versions

15 Days before Period of Performance End

Task 7**i. Interim Deliverables****Schedule**

Windows XP based HBM model software: source code (interim)

Weekly/As Available

Windows XP based HBM model software: executable (interim)

Weekly/As Available

Linux based HBM model software: source code (interim)

Weekly/As Available

Linux based HBM model software: executable (interim)

Weekly/As Available

ii. Draft Deliverables**Schedule**

Windows XP based HBM model software: source code (draft)

45 Days before Period of Performance End

Windows XP based HBM model software: executable (draft)

45 Days before Period of Performance End

Linux based HBM model software: source code (draft)

45 Days before Period of Performance End

Linux based HBM model software: executable (draft)

45 Days before Period of Performance End

iii. Final Deliverables**Schedule**

Windows XP based HBM model software: source code (final)

15 Days before Period of Performance End

Windows XP based HBM model software: executable (final)

15 Days before Period of Performance End

Linux based HBM model software: source code (final)

15 Days before Period of Performance End

Linux based HBM model software: executable (final)

15 Days before Period of Performance End

SOW

Contract: EP-W-09-024, Work Assignment: 0-15

Task 8

Monthly Progress Reports

Monthly

Weekly Status Reports

Weekly

Teleconference Meetings

Weekly

Task 9 – General Technical Direction

On-Going/Continuous

Period of Performance:

The period of performance of this WA will begin with the date of the Contracting Officer's signature and extend until June 22, 2010.

EPA WAM:

Eric S. Hall

U.S. Environmental Protection Agency

Office of Research and Development

National Exposure Research Laboratory

Human Exposure and Atmospheric Sciences Division (E205-02)

Research Triangle Park, NC 27711-0001

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United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number
0-16

☒ Original ☐ Amendment Number:

Title of Work Assignment
"Technical Support for the Enhancement
and Debugging of SuperMUSE VI, 3MRA
V1/V2, and FRAMES V2 Software Systems"

Contract Number
EP-W-09-024

Contract Period
Base ☒ Option Period Number

Contractor
BATTELLE MEMORIAL INSTITUTE

Specify Section and Paragraph of Contract SOW
See the following Statement of Work

Purpose: ☒ Work Assignment Initiation ☐ Work Assignment Close-Out
☐ Work Assignment Amendment ☐ Incremental Funding
☐ Work Plan Approval

Periods of Performance
From: 05/20/10 To: 06/22/10

Comments:
Work Assignment Initiation

☐ Superfund

Accounting and Appropriations Data

☒ Non-Superfund

Line	DC (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class	Amount	(Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1											
2											
3											
4											
5											

Authorized Work Assignment Ceiling

Contract Period: Cost/Fee LOE
Previously Approved

This Action

Total \$0.00 598

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: \$0.00 LOE: 598

Work Assignment Manager Name

JUSTIN E. BABENDREIER

(Signature)

(Date)

Branch/Mail Code

Phone Number (706) 355-8344

Fax Number (706) 355-8302

Project Officer Name

SINETA WOOTEN

(Signature)

(Date)

Branch/Mail Code 7404T

Phone Number (202) 566-0501

Fax Number (202) 566-0469

Other Agency Official Name

(Signature)

(Date)

Branch/Mail Code

Phone Number

Fax Number

Contracting Official Name

CHRISTINE EDWARDS

(Signature)

(Date)

Branch/Mail Code 3803R

Phone Number (202) 564-2182

Fax Number

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)

Date

"Technical Support for the Enhancement and Debugging of SuperMUSE VI, 3MRA V1/V2, and FRAMES V2 Software Systems"

Contract: EP-W-09-024, Work Assignment: 0-16

Summary Information

Title: "Technical Support for the Enhancement and Debugging of SuperMUSE VI, 3MRA V1/V2, and FRAMES V2 Software Systems"

Period of Performance: From: 05/20/10
To: 06/22/10

Award Date:

Total Funding:

Procurement Management Roles

WORK ASSIGNMENT MANAGER:

U.S. E.P.A.
Attn: JUSTIN E. BABENDREIER
COLLEGE STATION RD
ATHENS, GA 30613

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Fax Number: (706) 355-8302
E-Mail Address: babendreier.justin@epa.gov

Attachments

Attachment Name

"Technical Support for the Enhancement and Debugging of SuperMUSE VI, 3MRA V1/V2, and FRAMES V2 Software Systems"

**"Technical Support for the Enhancement and Debugging of SuperMUSE V1,
3MRA V1/V2, and**

Contract: EP-W-09-024, Work Assignment: 0-16

Statement of Work

1

Scope of Work
WA 1-#; OPPT Contract EP-W-09-024

Title:

Technical Support for the Enhancement and Debugging of SuperMUSE V1, 3MRA V1/V2, and FRAMES V2 Software Systems

Research Program for Sensitivity and Uncertainty Analyses

EPA/ORD/NERL/ERD's research program for investigating sensitivity and uncertainty analyses for various environmental models currently utilizes a series of 400 PCs linked together in a local area network. This bank of PCs, a functional equivalent to a supercomputer, allows for computationally intensive modeling experiments to be conducted. The methodology focuses on computing many simulations of a single model or modeling system application. The cluster is referred to as SuperMUSE – Supercomputer for Model Uncertainty and Sensitivity Evaluation.

The PC cluster and associated management software currently support 32-bit Windows-based operating system environs, and are capable of supporting Linux-based operating systems. To fully utilize this network of PCs, a variety of software tools have been developed using a standard database structure based on contemporary open-source MySQL. Many of the tools are model-independent, where example model dependent prototypes have also initially been developed for simulation of Version 1.x of the FRAMES 3MRA modeling technology.

This statement of work covers maintenance and enhancement of FRAMESv2, SuperMUSE 1.0 and 3MRA 1.x/2.x tools, and support in software development for additional tools for uncertainty and sensitivity assessment.

Background

The Framework for Risk Analysis in Multimedia Environmental Systems (FRAMES) - Multimedia, Multipathway, Multireceptor Risk Analysis (3MRA) software system is an integrated multimedia modeling system for assessing exposure and risks from the release of hazardous materials placed into a variety of land-based waste management units. The FRAMES 3MRA Version 1.0 (FRAMES 3MRA 1.0) software system was constructed to perform risk analyses for the U.S. Environmental Protection Agency (EPA) Office of Solid Waste to help establish constituent-specific "exit" (e.g., safe disposal) levels for low risk solid wastes. In the design of FRAMES 3MRA, the component-based approach provides for 1) standardized tools and techniques that are typically used in the assessment process, and 2) capabilities for new functionality to be added.

The FRAMES 3MRA 1.0 was originally designed to run on a single PC computer system. It was found that parallel execution across a number of machines would be valuable, helping to expedite simulation experiments needed for large, national-scale studies and various

uncertainty and sensitivity analysis studies. The FRAMES 3MRA 1.x version of the software was designed and built to allow for, among other capabilities, parallel execution of the FRAMES 3MRA 1.0 modeling system across multiple machines. FRAMES 3MRA Version 2.0 software components, covered under this scope as well, represents a further, significantly enhanced software technology that replaces the system user interface with a more generic user interface concept.

To successfully control and implement the FRAMES 3MRA 1.x system so multiple (e.g., millions) runs can be simultaneously executed and tracked on the 400+ machines, a number of software tools have and are being developed to help manage the operation of the system, as well track files, warnings, and errors. Because the vocabulary can be daunting at times, a number of key components are defined as follows:

- **Aggregated Exit Level Processor II Visualization (AggELP2Vis)**—The AggELP2Vis is a program that performs many of the same operations as the AggELP2MySQL, but instead renders a hypertext markup language (HTML) document that shows all the scenarios in a single context. The original ELP2/RVP allows a user to see one chart at a time, whereas the AggELP2Vis allows the user to see all scenarios and impacts on populations, cohorts, distances, exposures, and receptors that are not specifically protected. A GNUPlot is used to generate the charts.
- **Aggregated Exit Level Processor I for MySQL (AggELP1MySQL)**—The AggELP1MySQL is a program logically identical to the original ELP1 with the simple change that the information is stored in a My Structured Query Language (MySQL) database instead of MS-Access. The resulting file is used as input to the AggELP2MySQL and the AggClientCollect.
- **Aggregated Exit Level Processor II for MySQL (AggELP2MySQL)**—The AggELP2MySQL is a program logically identical to the original ELP2/RVP that reads its inputs from the MySQL database. The results are tables stored in MySQL that are equivalent to the original Protective Summary Output Files. Setting the scenarios in this tool facilitates the AggELP2Vis in displaying all the scenarios simultaneously.
- **Andres Iterated Fractional Factorial Design Dynamic Link Library (AIFDDLL)**—The AIFDDLL is the Enhanced Computational Optimization Sensitivity Uncertainty (ECOSU) compliant implementation of a grouping and input changing strategy that seeks to determine which variables in a large number of variables change the output the most. It is a screening method for finding the most sensitive parameters. The AIFDDLL is delivered as a set of subroutines and functions that are part of a dynamic library.
- **Batch Tasker**—This is a Model Tasker similar to the Command Tasker but without the restriction of executing commands on specific machines. The Batch Tasker consumes a text file where each line is a command. Each command is invoked in order on the next available machine.
- **Central Processing Unit Allocator (CPU Allocator or CPUa)**—The CPUa is responsible

for making sure available machines are assigned to a Model Tasker running on some machine in the cluster. Every machine is a slave to a specific CPUa, as there can be multiple CPUa's. The Model Tasker, CPUa, and Tasker Client continuously communicate with each other.

- **Client Collector for Aggregated Exit Level Processor I (CCAggELP1)**—The CCAggELP1 is an application that reads two instances of the output of the AggELP1 and merges them into a single instance. This is used to collect the output of ELP1 in pairs across the cluster of machines. The CCAggELP1 is intended to collect simulation results from another single machine. A collection across a large number of machines can then be done by simply using CCAggELP1 to collect the results in pairs and then collect those results into pairs again, and so on until all the results are accumulated on a single machine. The client collect tool takes the results that are produced on each individual client and compiles them into a single database.
- **Command Tasker**—The Command Tasker is a specialized Tasker that is essentially a server-end batch file manager. The Command Tasker executes commands on specific machines in a specific order. It provides machine-specific commands, based on a set of prerequisite tasks and takes a series of commands, but confirms that specified previous commands have already been executed, thereby accounting for dependent commands (e.g., delete files in a certain order). Similar to the capabilities of the Update Client tool, and actually representing a Model Tasker, this tool delivers binary tree task dependencies in a collection of common aggregated data/files, or reversibly, in distribution of common data/files. The Command Tasker acts as a Model Tasker in managing activities across the cluster, allowing the user to issue commands to clients (e.g., DOS commands for Windows or shell scripts for Linux) that are executed by the Tasker Client. Extensively generic in form, it is currently used for conducting log-scale database collections for 3MRA experiments and for more quickly executing file-management tasks that take individual PCs substantial time to complete.
- **Delegating Dynamic Link Library (DDLL)**—This library is a single entry point for any ECOSU compliment DLL to provide sampling algorithms. For example, if Monte Carlo is chosen as a sampling approach, the DLL is responsible for redirecting all calls to sampling algorithms and all results to the actual Monte Carlo functionality.
- **Enhanced System User Interface (ESUI)**—The ESUI provides the user with an enhanced ability to pick and choose specific input combinations of chemical name, site ID, realization, and concentration of waste (Cw), so only that specific run or set of runs are executed and where one does not have to look through a large number of simulation sets to get to the specific run. All information is stored in the 3MRA header file [hd.ssf].
- **Enhanced 3MRA Chemical Properties Processor**—This is a logically identical chemical property processor that reads its input data from the cp.ssf file instead of reading the ASCII data file originally stored in the CPData directory. The site definition processor (SDP) will read the cp parameters as any other component; it will then call the enhanced CPPDLL. The CPPDLL is responsible for populating all the original values in the cp.ssf datafile from the

data provided in the cp.ssf from the SDP.

- **Enhanced 3MRA SUI Deterministic Switch**—This is an addition to the Enhanced System User Interface (ESUI) that allows the user to choose the sampling technique and whether full sampling is accomplished or just a deterministic run. Under FY05 development, the ESUI will be able to run the DSP and allow the user to change the sampling algorithms as well.
- **Enhanced 3MRA SDP Deterministic Switch**—This switch is an addition to the SDP that allows the use of central tendency instead of actually sampling the value from the distribution. The changing value of the sampling technique is passed onto the Delegating Dynamic Link Library via this SDP enhancement.
- **FRAMES-2.0**—The Framework for Risk Analysis in Multimedia Environmental Systems-Version 2.0 (FRAMES-2.0) is a system that allows legacy disparate models and databases to communicate in a plug and play atmosphere. It combines many of the best features of FRAMES version 1 (e.g., Framework User Interface) and FRAMES 3MRA 1.0 (e.g., Application Programming Interface).
- **FRAMES 3MRA**—The Framework for Risk Analysis in Multimedia Environmental Systems (FRAMES)-Multimedia, Multipathway, Multireceptor Risk Analysis (3MRA) software system is an integrated multimedia modeling system for assessing exposure and risks from the release of hazardous materials placed into a variety of land-based waste management units.
- **FRAMES 3MRA 1.0**—The FRAMES 3MRA Version 1.0 software system was constructed to perform risk analyses for the EPA Office of Solid Waste to help establish constituent-specific "exit" (e.g., safe disposal) levels for low risk solid wastes. In the design of FRAMES 3MRA, the component-based approach provides for 1) standardized tools and techniques that are typically used in the assessment process, and 2) capabilities for new functionality to be added. The FRAMES 3MRA 1.0 was originally designed to run on a single PC computer system.
- **FRAMES 3MRA 1.x**—The FRAMES 3MRA 1.x version of the software was designed and built to allow for, among other capabilities, parallel execution of the 3MRA 1.0 modeling system across multiple machines. It was found that parallel execution across a number of machines would be valuable, helping to expedite simulation experiments needed for large, national-scale studies and various uncertainty and sensitivity analysis studies.
- **FRAMES 3MRA 2.0**—The FRAMES 3MRA Version 2.0 represents a further, significantly enhanced version of the FRAMES 3MRA 1.x software technology by replacing the system user interface with a more generic user interface concept.
- **Framework User Interface Tasker (FUITasker)**—The FUITasker modifies module inputs and either wraps the entire file set and sends it to the Tasker Client for further processing or performs the required processing locally. The FUITasker is a single looping capability for Framework for Analysis of Risk in Multimedia Environmental Systems (FRAMES) 2.0 that

allows the user to change the value of any single parameter. The looping can be executed on a single computer (called serial mode) or on the cluster (called parallel mode).

- **Latin Hypercube Dynamic Link Library (LHSDLL)**—The LHSDLL is the ECOSU compliant implementation of the Latin Hypercube sampling algorithm. The LHSDLL is delivered as a set of subroutines and functions that are part of a dynamic library.
- **Model Tasker**—The Model Tasker is a type of a component that provides a listing of things to do and resides on some machine in the cluster. There are many examples of this type of component: the Batch Tasker, Command Tasker, SUI Tasker, and FUITasker are actual examples in use. The Model Tasker, CPUa, and Tasker Client continuously communicate with each other.
- **Morris One-at-a-Time Dynamic Link Library (MOATDLL)**—The MOATDLL is the ECOSU compliant implementation of a one at a time input changing strategy associated with Morris. The MOATDLL is delivered as a set of subroutines and functions that are part of a dynamic library.
- **Process Error Program (PEP)**—The PEP is program that is designed to read the errors and warning files produced by FRAMES 3MRA hwirio.dll and store them in a central MySQL database. The PEP is used to keep track of which components in the simulation have succeeded or failed. It provides the user with the ability to capture error and warning messages and store them in the same location as the Site Summary Tool (SST). It works on the assumption that when any component of the system software fails, an error or warning file is produced in the grf directory. The PEP simply copies the Warning or Error file from the grf directory to the MySQL database that is referenced in its command line and, therefore, has no user interface.
- **Refactored Monte Carlo Dynamic Link Library (RMCDLL)**—The RMCDLL is the ECOSU compliant implementation of Monte Carlo sampling. The RMCDLL is delivered as a set of subroutines and functions that are part of a dynamic library.
- **Site Summary Tool User Interface (SSTUI)**—The SSTUI allows the user to pick-and-choose output from a set of 3MRA model input and output files (site simulation file [SSF] and global results file [GRF] files) via the SST. For example, it will allow you to define how to extract information for a variable for a specific chemical and location but averaged for all times. It allows one to statistically roll-up outputs.
- **Site Visualization**—This is a program that displays a plot of all results that have time as a dependent variable. It starts at the source and ends at human and ecological exposure. This application uses GNUPlot to generate charts while the application itself creates an HTML document that has the charts organized in a logical manner.
- **Site Summary Tool (SST)**—The SST is a program that allows the user to extract, summarize, and store modeling results in a database. The SST requires the user to create an instruction *.csv script file that describes what information to consume (i.e., extract) from

model inputs and outputs for a single FRAMES 3MRA 1.x simulation. The SST extracts information from the SSF and GRF files, given a text file that describes the variable to be extracted and how to summarize those data. The results of the extract and summary are stored in a MySQL database.

- **System User Interface Tasker (SUITasker)**—The SUITasker reads a header file and buffers up compute jobs so no machines are waiting to execute a job. It passes RunAll.bat and then launches Run.bat, which is on all machines.
- **Tasker Client**—The Tasker Client is the workhorse of the parallel software system. It is a generalized batch file execution tool that uses transmission control protocol/Internet protocol (TCP/IP) to get the information about 1) the job it should contribute to and 2) the specific task it needs to perform. The task is communicated in a single Unicode Transformation Format (UTF) string that contains the batch file and a number of additional text files. It runs the actual jobs and is a slave to the CPUa and then to a Model Tasker to complete a computational task. When the Tasker Client has nothing to compute, it goes and finds something to compute from the CPUa. The Model Tasker, CPUa, and Tasker Client continuously communicate with each other.
- **Tasker**—In the parallel software system, a Tasker is any program that generates tasks that need to be performed and registers itself with the CPU Allocator. It is implemented as a TCP/IP server that waits for client machines to be directed to the Tasker by the CPU Allocator.
- **Update Client**—The Update Client 1) prepares the machines for use in the cluster, 2) copies new executables to all machines in the cluster, 3) reads list of computers, and 4) picks computers. Additional features include creating an input file for the command tasker that can collect, distribute, or invoke a command in parallel across the cluster. The Update Client tool facilitates the execution of Operating System (OS) level commands (e.g., DOS/Linux commands, batch/script files) on a large number of machines that comprise a cluster. There are two modes of operation: serial or parallel. The tool can be used, for example, to copy a single file to multiple machines, in serial or in parallel, using a binary tree scheme. In serial mode, it can also be used to perform a variety of file management tasks, such as deletion or alteration of file attributes across a network. The enhanced parallel-mode version can replace an additional set of variables with information from a partner machine.
- **FRAMES V2**— Not specifically listed and described by constituent item here, various tools, processors, models and datasets comprise V2 and form the initial starting basis for work described under this, where many of these components have analogies to those described above for 3MRA V1/V2.

Tasks:

The following tasks list the specific work required.

Task 1: Workplan Development and Project Management

The objective of this task is to document a detailed workplan in response to the Work Assignment Scope of Work. The contractor shall document a technical plan and cost summary for conducting the assigned work. Upon approval from the EPA Work Assignment Manager the contractor shall initiate efforts.

Deliverables and Schedule:

1. Detailed workplan describing the technical approach to achieving the objectives of the work assignment.

Due date: 10 days after receipt of authorization to begin work. Within 30 days of delivery the EPA will document a response to the workplan.

2. Monthly reports: The contractor shall provide monthly reports describing technical progress and related resource status.

Due date: The contractor shall provide a monthly report on or before the 10th of each month during execution of the work assignment.

Task 2: Maintenance and Enhancement of SuperMUSE V1, FRAMES V2, and 3MRA V1/V2 Software Systems

The objective of this task is to provide software maintenance and enhancement support for the SuperMUSE 1.0, FRAMES V2 and 3MRA V1/2 software systems.

General Tasking to be Performed

Software maintenance tasking to be performed by the contractor will include:

- Telephone or email communications with the WAM or the WAM's technical support staff.
- Troubleshooting and resolution of bugs identified by EPA, and those bugs that arise out of testing and evaluation performed by the contractor,
- Development and/or revision of spreadsheet-based test plans, and
- Execution of test plans.

Software enhancement tasking to be performed by the contractor will include:

- Telephone or email communications with the WAM or the WAM's technical support staff.
- Modification of existing software to address new requirements specified by EPA,
- Troubleshooting and resolution of bugs identified by EPA during subsequent testing,

- and those bugs that arise out of testing and evaluation performed by the contractor,
- Development and/or revision of spreadsheet-based test plans, and
- Execution of test plans.

Software documentation and test plans, currently located on USDA's COLAB Development Environment (<https://colab.sc.egov.usda.gov/cb/workspace.do>; 3MRA FRAMES V2 Project Area) will be the basis for evaluation of existing software requirements and functionality. Additional software requirements associated with component enhancements will be specified by EPA through Technical Directives associated with this statement of work.

Development, modification and/or enhancement of existing documentation (i.e., the formal documents which include sections on descriptions, requirements, design, and specifications) will be the responsibility of EPA.

In addition to revision, execution, and documentation of test plans, the contractor will also be responsible for providing brief summary descriptions (using notation and/or file management features of COLAB) on changes to design and specifications sections as may be needed to maintain and/or enhance software (e.g., brief statements indicating information that may need addition/modification, dictionary and/or database table structure definitions that may need addition/modification, etc).

Specific Technical Directives

The Agency will provide a written description of each request for work to be completed on specific software components, and the required schedule. These requests will be referred to as Technical Directives and will generally indicate: a) the software component(s) to be tested, de-bugged and/or enhanced, b) initial formulations of any new or modified software requirements, and c) a not-to-exceed number of hours of Senior Software Engineer (e.g., software development) time and Software Engineer (i.e. software testing) time that may be expended by the contractor on the given request. EPA will be responsible for posting an initial set of bugs to COLAB. New requirements desired by the Agency will each be posted to COLAB as a bug, with an indicator that the bug is associated with a new requirement.

It is anticipated that several components may be associated with a given request, where work on individual components may or may not be directly related. It is also anticipated that more than one technical directive may need to be active at a given time to address new issues that may arise in bringing closure to an existing request.

Because a given bug cannot always be immediately associated with a given component, it is anticipated some components will be specified in the request that ultimately do not need modification.

While fulfilling a given Technical Directive, in the event an additional component(s) is identified by the contractor as needing enhancement or modification to achieve the original request, the contractor shall: a) post associated bugs on COLAB; and b) notify the WAM. As determined by the WAM, a new or modified request will be issued to handle associated software

enhancements or modifications of the newly identified component.

The contractor may evaluate any existing SuperMUSE 1.0, FRAMESv2, and 3MRA V1/2 software codes for any component at anytime as needed to execute a given request (including execution of informal software testing by the developer), but shall not post enhanced or modified codes to COLAB, or conduct formal testing of any component, unless that component has been identified in a specific request.

Contractor Response to Specific Technical Directives

Prior to initiation of actual bug resolution or enhancement through software development efforts, the contractor will first:

- Review the request,
- As needed review associated codes for components specified in the request, and
- Consult the WAM via telephone to discuss technical content of the request (e.g., to review and modify if necessary newly stated requirements, to discuss current software behaviors needing resolution, and to discuss initial technical approach to be taken to achieve software enhancement or modification).

For each request the contractor shall then execute the required enhancement/modification/testing, and deliver the resulting source code, software, test plans, and summary notations on design and specifications to the Agency via the COLAB development environment.

During execution of the WA, the contractor shall:

- Attempt to hold phone discussions with the WAM approximately biweekly to discuss technical progress on all active requests.
- Notify the EPA WAM via direct email or other automated COLAB email-based communication when a successfully executed test plan (less Agency approval) for a given component has been posted to COLAB.

In closing out a given request, the contractor shall provide a Summary Technical Progress Report in email form to the WAM if one or more components were not completed due to lack of funds. In this case, the contractor shall briefly summarize (e.g., in simple table format) which deliverables were not completed for each component.

Processing and Documentation of Software Bugs

For each component, until successfully executed test plan (with Agency approval) status has been reached, it is anticipated that the Agency and the contractor may post new bugs that are identified during review and testing associated with a given request. All detailed notations on specific bugs to be resolved and bug resolution will be conducted via COLAB by both EPA and the contractor. Any new bug identified by the contractor during execution of this WA, which substantially changes existing specifications and design shall be posted to COLAB and appropriate notations provided (i.e., the Agency requires that all substantial changes made to the software are documented through COLAB bugs and COLAB notations for component design and specifications). Any bug identified but not resolved by the contractor during execution of this WA, which substantially affects attainment of the component's stated software requirements,

shall also be posted to COLAB (i.e., the Agency requires that all known remaining software deficiencies identified by the contractor during testing be documented in COLAB). Minor bugs that are resolved during evaluation, modification, enhancement or testing that do not substantially affect existing design and specifications documentation need not to be notated in COLAB.

Total Task Level of Effort

For purposes of estimating resources for this task the contractor shall assume an overall level of effort of approximately 598 hours total of software development, software testing, and project management which will be split across the two tasks and associated Technical Directives.

Deliverables and Schedule:

Specific SuperMUSE 1.0, FRAMESZV2, and 3MRA V1/V2 Software components to be worked on by the contractor, and associated schedule, will be determined during execution of the WA. In evaluating content and acceptance criteria for deliverables, the following will generally apply:

1. Successfully executed test plan status (less Agency approval) for a given software component requires that:
 1. Specific requirements related to the functionality of the software must be documented (as provided by the WAM within the Technical Directives);
 2. All identified software bugs have been resolved by the contractor or reconciled as future work to be completed by the Agency (e.g., some bugs may not be able to be resolved at this time within current resources);
 3. Summary notations on modifications and additions to design and specifications sections of formal documentation have been posted to COLAB by the contractor;
 4. Executed and notated test plans have been posted to COLAB by the contractor which satisfy all component requirements; and
 5. Source code and compiled software codes have been posted to COLAB.
1. Successfully executed test plan status (with Agency approval) for a given software component requires that:
 1. Successfully executed test plan status (less Agency approval) has been attained by the contractor for the given software component;
 2. The Agency has reviewed and approved the executed test plan (via email notification to the contractor).

Completion Status for a Specific Technical Directive

A specific Technical Directive will be deemed completed and no additional efforts should be expended by the contractor on the given request when either:

1. Currently approved hours associated with a given Technical Directive have been expended by the contractor and the contractor has provided a Summary Technical Progress Report for all components not completed,

1.a. Based upon the WAM's assessment of degree of completion, the WAM may reauthorize the existing technical directive by adding additional hours to further complete the specific request. Alternatively, the WAM may also either choose to not expend additional effort, or otherwise roll some part or all of remaining tasking still to be completed into a new technical directive.

1.b. In the event that the existing technical directive is re-authorized with additional hours and associated level of effort, the WAM will notify the contractor and EPA's Project Officer by re-issuing and notating the original technical directive, indicating both the previous authorized level already expended, the additional level (i.e., added hours) of effort that may be expended by the contractor, and priorities for the additional level of effort.

or

2. Successfully executed test plan status (with Agency approval) has been attained for all components identified in the request.

Special Conditions

1. All requests related to execution of the technical support described within this WA shall be coordinated through the EPA WAM.
2. The contractor shall not respond to requests or inquiries made by others individuals except where made by technical support staff approved by the WAM.
3. It is the responsibility of the contractor to ensure that a Summary Technical Progress Report for all components can be completed for a given request and delivered to the WAM prior to expending all hours for a given request (i.e., as necessary, final hours available for a given request should be used for this tasking).